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A Record Production

Last year, the British ironfoundry industry broke all records with a production of 3,388,121 tons, as against 3,283,901 tons in 1948 and 2,791,315 in 1947. Everybody is well aware, through the use of dignified but telling advertisements, of the great strides made by the iron and steel industry, yet since 1946 the production of iron castings has increased by 32.6 per cent., whilst the steel output has grown by 23.5 per cent. At one time it appeared that production by the iron foundries would not make such a good showing in 1949, for the statistics for the third quarter were distinctly poor in most sections of the industry, but after the inflation of the pound sterling output increased during the last quarter. The malleable section of the industry, however, at 120,447 tons produced 4,672 tons less than 1948. The stove-grate trade, too, produced some 6,000 tons less last year than in 1948. On the other hand, motor-car castings production increased by 5,000 tons, cast-iron pipes by 41,785 tons, and ingot moulds by 31,784 tons. These two sections of the industry have been in the main responsible for the over-all increase registered. The worse feature of these statistics issued by the Ministry of Supply is in the figures for the shipbuilding and repair industry, for the position disclosed is that at 114,049 tons it is 6,000 tons "down" on the 1948 figure. On a weight basis the position would appear to be little worse than that of the stove-grate section, but the making of marine-engineering castings is a highly skilled operation, whereas the manufacture of stoves is largely repetition work.

These figures, whilst patently satisfactory, leave no room for complacency. They are governed to a large extent by the heavier lines of production. The value of the production does not vary directly with the weight, yet by and large, the statistics now available are illuminating for those who care to undertake a simple analysis in respect to their own productions.

Solid-fuel-fired Domestic Apparatus

According to what we deem to be a reliable source of information we learn that after deducting exports and the coal used by the public utility authorities, there remains 46 million tons for use in industry and 3 million tons for domestic consumption. We are told 22,000 million therms are available from this latter amount. In the 1948 to 1949 electrical year, the 46.6 per cent. heating-lighting-and-cooking load took 18,184 million units or 620.64 million therms. The gas industry in 1947, for the same purpose, produced 486,377 million cub. ft. or 2,688 million therms. Thus it would appear that not within measurable time will either gas or electricity eliminate solid fuel as a domestic raw material.

Amongst the solid-fuel-burning stoves and boilers designed for domestic use are to be found some of the most economical apparatus ever devised by mankind. It so happens, however, because everybody is familiar with their functioning, that they are a prolific source of invention by the amateur. Again, some of the older designs, though not very economical in use, have lost but little of their popularity. We think that solid-fuel apparatus have suffered somewhat because,

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Solid-fuel-fired Domestic Apparatus

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unlike either gas or electrical appliances, they have not to be approved by any supply authority. In France, this function is undertaken by the "*Centre Technique.*" Each new model evolved by industry is sent to the "*Centre*" for testing, and if satisfactory it is kept as a reference and a standard to which all future production must conform. In this country, for some of the building estates, one of the Ministries does insist on compliance with some sort of specification. Moreover, one association of manufacturers for a time actually issued approval certificates.

It does seem to us that the time is ripe for an appropriate body of domestic solid-fuel-fired apparatus makers, either directly or through a scientific body, to issue some sort of approval certificate. This, we are sure, would be appreciated by the housewife, as is evidenced by the fact that an "Institute" organised by a woman's paper of American origin, "certifies" various things as being of a satisfactory character—and this very largely is accepted! With the present level of prices for coke and coal, more and more people will be forced to change over from uneconomic stoves to the modern efficient variety. As we have pointed out statistically the field is a particularly large one, with but little fear of foreign competition. It is obvious that some firms within this industry have realised not only their importance, but also the need for publicising the real advantages of the modern apparatus. An outstanding and brilliant example of such an effort was the tour of the "Allied Ironfounders" exhibition train and the film show that accompanied it. It has been found by more than one firm that, by insisting on the production of really economical units, overseas sales can be obtained. These models would easily merit the award of a "proficiency certificate," as would a really high percentage of current production. As for the balance, in the interests of national economy, they should re-design their models or bow to the inevitable.

W. H. A. Robertson Medal

The first award of the W. H. A. Robertson Medal of the Institute of Metals has been made to Mr. W. J. Thomas and Mr. W. A. Fowler for their Paper on "Some Technical Problems Influencing Production Economy in the Rolling of Aluminium." The Authors are assistant managing director and production manager (manufactured materials), respectively, of the British Aluminium Company, Limited. The presentation of the medal will take place at the Café Royal, Regent Street, London, W.1, next Wednesday.

A detailed programme of the 47th Annual Conference of the Institute of British Foundrymen, to be held at Buxton on June 6 to 9, is printed on pages 318 to 320 of this issue.

Forthcoming Events

MARCH 28.

Institution of Production Engineers.

Lincoln Sub-section:—Visit to Ruston & Hornsby, Limited, Boultham Works, Lincoln, commencing at 7 p.m.
London Graduate Section:—Visit to C.V.A. Jigs, Moulds & Tools, Limited, Portland Road, Hove, Sussex.

MARCH 29.

Institute of British Foundrymen.

London Branch:—"Patternmaking for General-engineering Castings," by H. S. W. Brittain at the Waldorf Hotel, Aldwych, London, W.C.2, at 7.30 p.m.

Institute of Production Engineers.

Shrewsbury Sub-section:—"Sand Casting," at the Walker Technical College, Oakengates, at 7.30 p.m.

APRIL 1.

Institute of British Foundrymen.

Lancashire Branch:—Annual General Meeting, followed by the Report and Recommendations of Sub-committee T.S.27, "Cupola Charge Materials," at the Engineers' Club, Albert Square, Manchester, at 3 p.m.
East Midlands Branch:—Annual Meeting, followed by a Short Paper Competition, at the Derby School of Arts and Crafts, Derby, at 6 p.m.

A New Irish Foundry

Parlanti Castings (Ireland), Limited, a branch of Conrad Parlanti Castings, Kent, hope to be in production in their new premises at Finglas, County Dublin, within the next few weeks. The foundry is a modern single-storey building 300 feet long by about 50 feet wide; the Finglas site is within 15 minutes of Dublin city on the bus route, and the district is being rapidly developed both as a housing estate and as a suburban industrial centre. Eight factories, including that of Parlanti, have recently been erected in the district.

Of interest to the local Irish is the intention of the firm to produce high-class bronze leprechauns. (Leprecacahun: the mythical "little man" or "brownie" supposed to help Irish housewives in country districts to do their chores.) These small statuettes will be intended primarily as souvenirs for the American market. The model for the casting will be chosen, it is hoped, from one of the many models which Irish artists were invited to submit. About 70 such models, and upwards of 100 drawings, were received; a series of prizes will be awarded, and if the winning model is used as a casting model, the designer will receive a royalty fee based on output.

For the casting, the "lost-wax" process will be used, and craftsmen familiar with it will be brought to the Irish branch factory to train Irish workers in its methods. The entire art side of the firm's trade is also being transferred to Finglas, and it is hoped to produce a variety of high-class Irish mementoes for the trade.

THE COUNCIL of the *Association Technique de Fonderie* announce that there will be no congress this year. They envisage, however, arranging a one- or two-day meeting in the provinces, possibly at Nancy.

MR. C. F. I. RAMSDEN, the overseas director of the Federation of British Industries, has left this country for a two-months' tour of the Middle East. Mr. Ramsden intends to visit Jordan, Syria, the Lebanon, Iraq, and Iran, returning through Turkey and Athens. The object of the tour is to study the present financial and industrial positions of these countries and to investigate the prospects for British exports in the future, particularly in large-scale development plans or contracts which may bring business in machinery and equipment.

Burn's Court Foundry Reconstruction

By John Blakiston, A.M.I.Mech.E.

This is a detailed account of the application of varying degrees of mechanisation to a group of iron and steel foundries at Howrah, Calcutta. Specially interesting are the means taken to adapt the foundry construction principles of the western world to the labour and climatic conditions obtaining in India. A number of novel features are fully described and illustrated.

FOR nearly two centuries the name of Burn & Company, Limited, has been associated throughout India with castings vital to the well-being of the country. It was therefore almost a foregone conclusion that the concentration of the first part of the firm's reconstruction programme should centre round the foundry portion of the organisation.

The first part of the reconstruction scheme is now approaching completion and the implications of modern foundry mechanisation are now becoming apparent to the lay observer. When the scheme was first visualised a bold step had to be taken, as, up to date, a fully-mechanised foundry project had not been attempted in India, and its impact on the Indian labour situation, and operation under tropical conditions, could only be visualised in an abstract manner. The very nature of the Indian market and commercial fluctuations in themselves presented problems, as the foundry had to be constructed with the assumption that certain of the basic production lines of components could be discontinued, or entirely re-designed, without notice. In addition to this, the plant would have to cater for a wide range of work stretching, on the one hand, from single individual components weighing many tons, to light individual units weighing a few ounces, at the other end of the scale. Between these extremes there was a more or less constant demand for railway-sleeper chairs, the design of which could be superseded at short notice. It was decided that the two foundries in the works, one in the main works and the other in Burn's Court, should be joined together in one large covered building situated in the Burn's Court area, bounded on one side by the Port Commissioner's line and on the outside by a public highway. The site limitations in themselves presented certain difficulties, particularly as to stocking facilities, but in spite of this it was found possible practically to circumscribe the half-moon shaped area by the 5 ft. 6 in. broad-gauge railway (which, augmented by sidings, served to bring in the raw materials at one end of the site) and to accept the delivery of finished castings at the other end. This outlet, apart from having convenient access to the main railway sidings, also has access to the rest of the works for the despatch of castings to be machined. A light diesel locomotive serves the foundry, placing the wagons where required.

Layout

The foundry as designed is divided into five main sections all under the one roof and intercommunicating. These sections comprise the steel foundry, the general iron foundry, main mechanised section, heavy mechanised section and light mechanised section. Also included in the scheme are the usual service departments such as the pattern shop, maintenance department, etc. As the whole plant was of a pioneer nature for India, the mechanisation of certain sections was not carried to the full extent, it being considered that the best policy was to try out the various conceptions, elaborating and adding to them as the various portions of the plant proved to be acceptable to the conditions prevailing.

The total weekly output estimated figures are made up as follows:—

450 tons of sleeper castings or similar, representing 2,000 sleepers (or equivalent) per day; 60 tons jobbing castings, partially mechanised work; 30 tons loam-sand moulded castings; 30 tons light castings from mechanised plant; 50 tons steel castings.

Buildings

The buildings comprise six bays, the side covering being interrupted to form wide, flared louvres which, in conjunction with the permanently-open, north-facing, saw-tooth roof construction, produce a constant air current which makes the working conditions much cooler than is normally experienced in the older-type building. The building is of steel construction with sheeted covering, but certain portions of the roof in the vicinity of the melting furnace are tiled. The six bays are linked together by means of an electric transfer car, and a system of 18-in. gauge light railway and turntables, working in conjunction with this car, forms a convenient method of intercommunication and material transfer. The last development of the material handling is the installation of a system of overhead pendulum conveyors installed in three sections inter-connecting the foundry sub-sections which form a permanent production sequence.

Metal Melting

The 5-ton open-hearth steel furnace of the old foundry was retained in the new scheme, the old buildings being entirely demolished and the bays of the new building, together with the cranes, being installed at right angles. The whole change-over took place without any loss of production other than that normally occasioned by a furnace re-lining operation.

The grey-iron melting is carried out in six cupolas, one battery comprising two 9-ton-per-hour-capacity furnaces, and two 14-tons-per-hour furnaces, mechanically charged by means of bell-bottomed buckets lifted and inserted into the furnaces by means of a 3-ton snout charging crane (Fig. 1). The main supply of pig iron, coke and limestone, etc., delivered in 20-ton wagons, is hauled up an incline to an elevated gantry by means of a power-operated winch. This material is discharged on to a parabolic bench (Fig. 2) under which passes the charging skips carried by frictionless bogies assisted by the slight inclination on the 18-in. gauge track which slopes towards the cupolas. As the skip passes underneath the parabolic bench the various portions of the charge are dropped into it through circular holes, the final weight being taken and adjusted at a conveniently-placed weighing station.

When the charging buckets are opposite their respective cupolas they are picked out of the bogie by means of the charging crane (Fig. 3). Meanwhile, the bogie

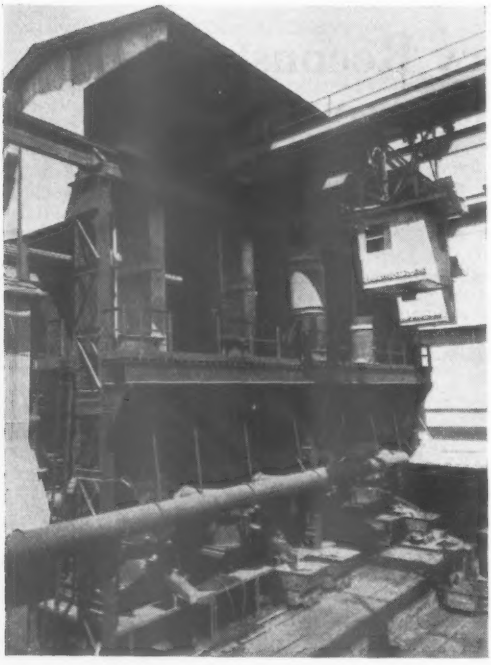

FIG. 1.—CHARGING-SIDE OF THE MAIN CUPOLA PLANT. DROP-BOTTOM BUCKET BEING HOISTED BY THE SNOUT CRANE.

is transferred to a return track, having the necessary slope in the reverse direction to make it mobile, by means of a pneumatically-operated incline transfer car, the bogie waiting for the lowering of the empty charging skip in line with its previous loaded position. The main cupolas are blown by means of Rootes semi-positive blowers fitted with variable-speed regulators so that the melting rate of the cupolas, even with high-ash coke, can be readily adjusted to the melting requirements of the main foundry. This melting plant has now been in operation for some time and has worked extremely smoothly. The slag is disposed of by means of cast-iron tipping wagons, which can be seen in Figs. 1 and 3, utilising the cupola charging track for delivering the slag to a disposal point. Further experiments are taking place in view of the large amount of slag formed. This is caused by the high ash content of Indian coke, and tests are being carried out to see whether the installation of the water granulation system for slag removal will be justified.

Two 35-cwt.-per-hour cupolas in the centre of the foundry serve the light mechanised section. These cupolas use the return heads and risers from the main mechanised plant as a basis of the charge and not only melt metal for this light casting section, but are capable of manufacturing alloy cast iron, which can be distributed to the foundry by means of the light-railway inter-communicating system.

Sand Plant

The main mechanised section was put down primarily for sleeper production, but can be quickly adapted to manufacture any other type of casting within its capacity. This section is arranged around the central sand plant, shown in Figs. 4 and 5, which is so designed that it not only serves the machanised iron foundry and steel foundry, but can also prepare batch mixtures of sand for jobbing or specialised work. The main sand plant was supplied by August's, Limited, and comprises three No. 3-size Simpson mixers, having a combined maximum capacity of 90 tons of prepared sand per hour while working on a system sand, this figure being considerably reduced for heavily bonded sands as are used for the steel foundry. The layout of the sand plant is such that the sequence of sand flow can be changed about and diverted so that practically any combination of sand mixtures can be directed to any section of the foundry according to the desire of the superintendent.

The sand flow of the main mechanised plant is as follows: After the hot sand has been knocked out of the sleeper, or other moulding boxes, by means of a suspended vibratory knock-out, it passes through grids on to a moving belt conveyor and then passes underneath an Overband magnetic separator which removes any metal contaminating the sand; then it is lifted by

FIG. 2.—STOCKYARD PARABOLIC STORAGE BENCHES FOR CUPOLA RAW MATERIALS.

an elevator to the top of the building, whence it is fed into a rotary screen. This rotary screen is incorporated into an extensive sand-cooling plant which cascades the sand down a tower against a variable up-current of cool air. The sand is then again elevated to the top of the building and distributed to either of the three large sand-storage hoppers of 45 tons capacity each.

This method of cooling is somewhat of a trial nature as far as Indian conditions are concerned, because no data are in existence which give any guidance as to heat-transfer rate from sand to air under the variable climatic and humidity conditions normally experienced in the Howrah (Calcutta) area, where a normal temperature of 100 deg. F., with 90 per cent. humidity, is quite common. The return sand is next drawn off from any of the three return-sand storage bunkers, discharging direct into either of the two skips which feed the Simpson mills by means of bifurcated chutes. Into the skips are added any new sand additions, or synthetic materials, necessary to obtain the desired bond of the sand and the necessary properties to impart a fine casting finish. After the sand has been milled, it is discharged by pneumatically operated doors *via* feeder tables into alternate elevators. These elevators in turn deliver on to the distribution conveyors which transfer the sand to the moulding-machine hoppers. If desired, the sand can be diverted into four prepared-sand storage bunkers discharging above an 18-in. gauge railway track for distributing prepared sand for jobbing or specialised operations.

The return sand from the steel foundry, after passing through a vibratory knock-out, follows a similar procedure to that just described, except that a desilting unit is incorporated. The sand then passes over the three 45-ton return-sand storage bunkers (being ploughed off into the desired storage space) and returns back to the steel-foundry system, after preparation, by any circuit desired by the operator. It is possible, by the above arrangements, to turn the main iron mechanised section on to steel moulding at short notice should trade circumstances dictate this need.

Immediately behind the sand plant, covered storage is available to receive the sand in its raw form as received from the various deposits. This storage incorporates a simple crushing and screening plant so that the rock and other sands can be graded and broken down prior to adding to the main sand system. A 6-ft. Pneulec sand mill is incorporated into the sand-preparation system for the production of core sand; this core sand can either be the normal system sand, clay bonded, or

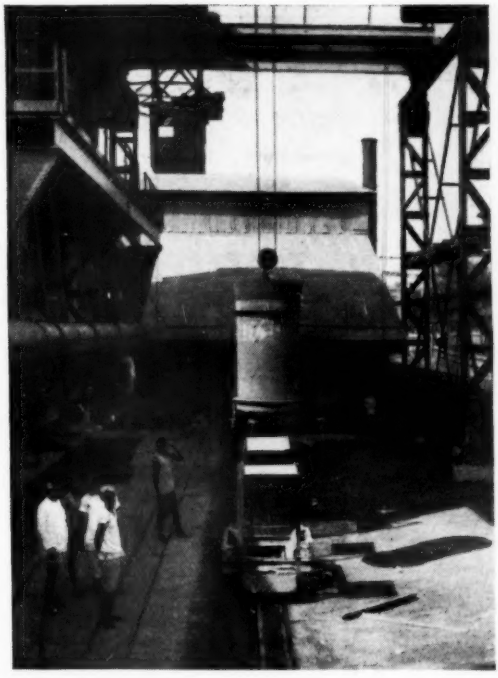

FIG. 3.—CONE-BOTTOM CHARGING SKIP BEING HOISTED OFF ITS BOGIE.

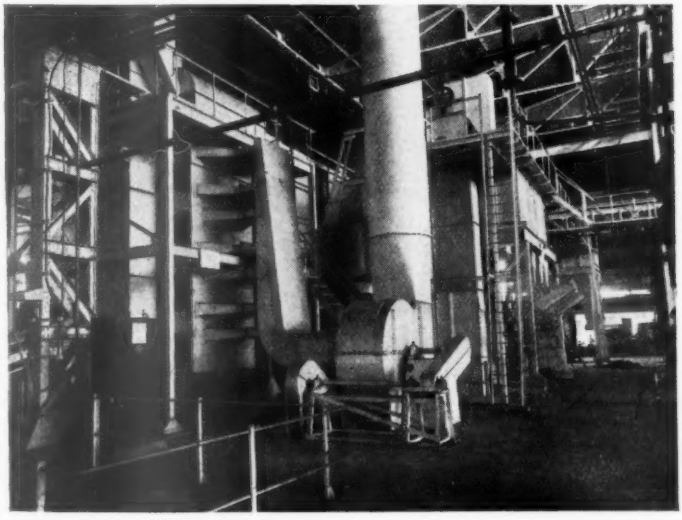

FIG. 4.—PART OF THE MAIN SAND PLANT SHOWING THE SAND-COOLING UNIT.

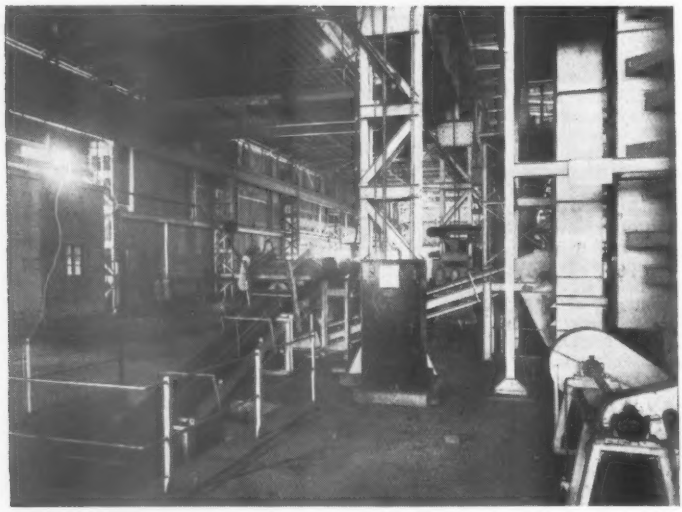

FIG. 5.—RETURN SAND CONVEYOR AND MAGNETIC SEPARATOR IN THE MAIN MECHANISED PLANT.

facilities exist for this mill to be switched over to a 100 per cent. oil-sand production. The sand is distributed to the core-making section direct by means of one of the overhead conveyor systems.

Main Mechanised Section

The main mechanised moulding system consists of three groups of eight machines, each group consisting of two pairs of machines, two drag machines and two top-part machines. These two pairs of machines are situated round a common shovel-feed hopper whose shovel platform is at the same height of the top of the moulding boxes with the minimum distance transfer. The standard size is 36 in by 33 in., to take a maximum pattern draw of 12 in. The present production is concentrated on a drag depth of 9 in. It will be seen from squeeze-turnover machines (Fig. 6). The final squeezing this that a considerable weight is to be handled during the production of each box part and it was decided, on account of the versatility required from the plant, to operate the moulding machines on the bank system, each unit of two pairs of machines having two prepared mould banks with a common box return between. The loading of the empty boxes on to the moulding machines is carried out by means of cross overhead runways, utilising pneumatic hoists or Roper hoists depending on the time cycle of the operation. It was decided to combine the mould bottom plate into a conveying bogie, and a design was evolved of an extremely strong construction to accommodate the squeeze pressure employed and, at the same time, maintain a minimum depth with the required rigidity. For the casting operation, the top part, drag and combined top and bottom plate, all are clamped together into a compact rigid unit.

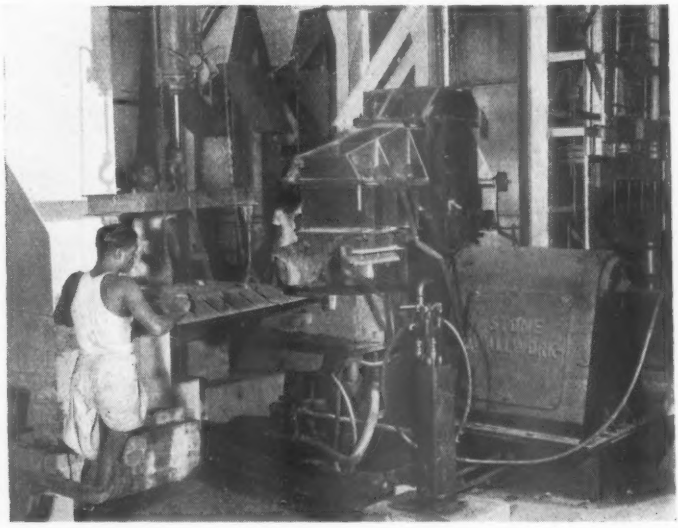

FIG. 6.—LOADING THE COMBINED MOULD, BOGIE, AND BOTTOM PLATE ON TO A MOULDING MACHINE FOR SLEEPER MOULDING.

The cycle of machine operation is as follows: The combined bogie and bottom plate is returned down the bank (which is composed of 20-lb. flat-bottomed 18-in. gauge rails) carrying on it, loose, the drag and top part. As these units pass in between the two pin-lift, top-part machines, a top part is lifted off the combination by means of a Roper hoist and placed on either of the two top-part machines, as required. The drag part and bogie then pass on through a tunnel underneath the sand-storage bunker, where they come beneath a pneumatic hoist which can quickly transfer the drag, or the combined bogie and bottom plate, to either of the jolt-squeeze-turnover machines (Fig. 6). The final squeezing operation of these machines presses this combined plant firmly to the drag and consolidates the sand to a rigid bearing area.

After the machine is turned over and the pattern has been withdrawn, two rails project from the presser head, and engage the wheels of the bogie; in the meantime, a drawbridge has bridged the gap between the machine and the casting bank, so that the complete drag mould almost shoots off the machine (Fig. 7). In between this moulding machine and the top-part machines, which have in the meantime been in operation for preparing the tops, the slips are removed from the mould and coring-up has taken place. As the bogies pass underneath the centre-line of the top-part machine, by means of the Roper-hoist lifting arrangement, the top parts are lowered (Fig. 8) and the moulds closed and clamped ready for casting. Each casting bank accommodates 25 complete moulds, each mould containing two sleeper chairs. The casting takes place along these banks from 8-cwt. ladles covered for heat conservation, these ladles in turn being replenished from a 3-ton drum-type receiver (Fig. 9).

FIG. 7.—SLEEPER MOULD BEING DELIVERED ON TO THE CASTING RUNWAY FROM A STONE-WALLWORK JOLT-SQUEEZE-TURNOVER MACHINE.

Knocking Out

After a short cooling time the moulds, having arrived at the end of the bank, are transferred by means of an overhead suspended, vibratory knock-out (Fig. 10) back to the return-box bank, the castings in the sand being dropped out over the knock-out grids during this procedure. The moulding cycle is thus completed; the boxes circulate round the system at the rate of 3 min. per box per bank, while the hot castings are raked on to a slat conveyor which immediately removes this from the vicinity of the operators in order to minimise the hot conditions usually surrounding this arduous operation. In addition to this, the sand-cooling plant is interconnected to all the knock-outs, so that a negative current of air is being drawn through the

FIG. 8.—CLOSING SLEEPER MOULDS.

FIG. 9.—3-TON CAPACITY ROPER PORTABLE RECEIVER LADLE REPLENISHING 8-CWT. CASTING LADLE.

knock-outs minimising objectionable fumes. The castings are carried down the slat conveyor to a common loading platform at the end of the mechanised plant, where the heads, risers and any obvious waster castings are segregated into skips. The sound castings are transferred into groups of four on to a slow-moving pendulum conveyor which transports them the full length of the foundry, passing *en route* through a two-unit Wheelabrator plant, so that they finally emerge in the fettling section in a sand-free condition.

The plant is being designed so that at a later date it would be possible to instal electrically operated, push-button-control, sand-feeder hoppers over the machines, but at this juncture it was felt that the shovel-feed hoppers would be the most economical proposition, particularly as the sand-ramming density of the top parts on the pin-lift machine is of major importance for the successful operation of the plant, and it was considered that the installation of chopper-feed sand hoppers, in the hands of unskilled labour, would have brought in their train a host of troubles through irregular ramming.

Heavy Mechanised Section

This section was designed to cater for a wide range of jobbing castings ordered in limited batches where, on account of the size, no comprehensive mechanisation scheme could be envisaged, but modern moulding methods, combined with mechanical aids, would mainly reduce the cost of production. This section comprises three moulding stations for the preparation of moulds. The first station comprises a large Herman moulding machine capable of ramming, turning over and drawing the patterns from medium-to-large moulds. The second station comprises a plain jolting machine (Fig. 11) which undertakes the ramming operation only. This jolting machine can take moulds up to 5 tons. The last station comprises a 12-ft. radius Sandslinger unit (Fig. 12) the scope of which covers any box size likely to be encountered in the foundry within the crane capacity. The sand for this system is distributed to the various machines by means of an overhead conveyor and is merely reconditioned by the adding of water and by aeration.

Special facing sand is applied to the individual patterns as required, this sand being absorbed into the system. The section is situated adjacent to two of the large drying stoves so that dry-sand work can be prepared in a similar manner to green sand. After the casting operation has taken place, which is usually

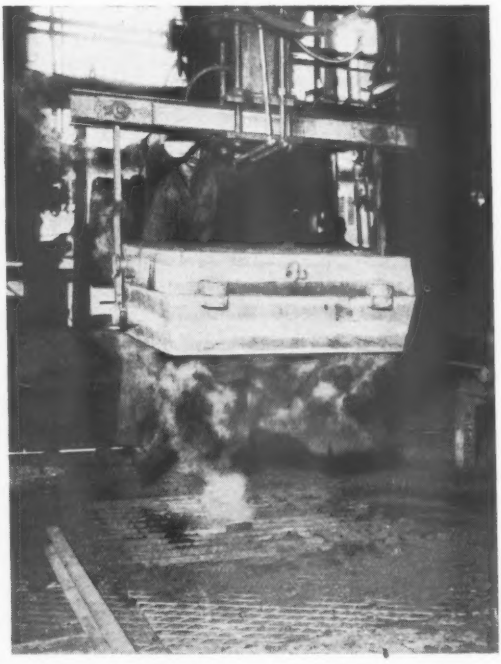

FIG. 10.—SLEEPER MOULD KNOCK-OUT FROM SUSPENDED VIBRATOR.

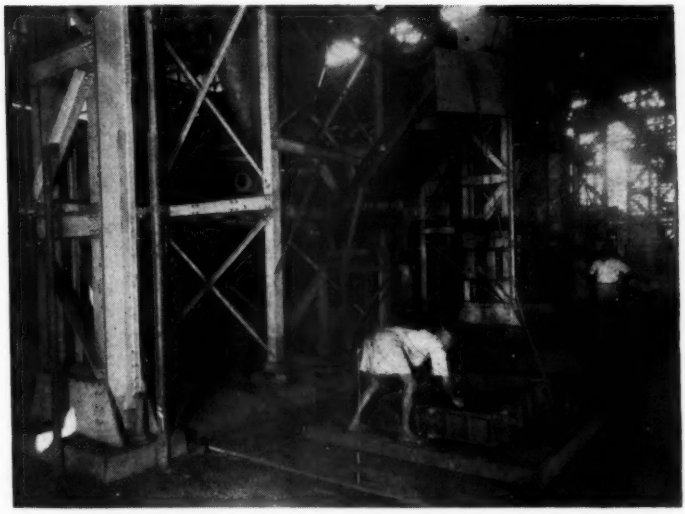

FIG. 11.—PLAIN JOLTING MACHINE IN THE MECHANISED PLANT FOR HEAVY MOULDS.

in the latter part of the day, the boxes are knocked-out during the night and placed beside the respective moulding stations ready for the next day's work. In the meantime the sand is piled and tempered ready for feeding into the knock-out for aeration and distribution. Mechanical aids installed for the heavy mechanised section, permit, by reason of the consistent ramming methods and mechanical pattern drawing, a much truer casting shape to be obtained with a corresponding saving on the amount of skilled and unskilled labour.

Light Mechanised Section

The light mechanised section (Fig. 13) is an entirely self-contained unit capable of producing up to 60 tons of castings per week. This section also incorporates a certain amount of plate-moulding work and small jobbing moulds, which are never likely to be entirely superseded on account of some of the limited but still essential requirements of certain customers. The plant consists of two small cupolas already described, together with a conveyor which is laid out in horse-shoe form. At the end of one leg of the conveyor is situated a pair of machines supplied by British Moulding Machines Company, Limited, which have overhead sand hoppers supplied from a common knock-out; this knock-out is situated adjacent to the other leg of the conveyor. By this arrangement, the boxes, together with the sand, are brought back to the original moulding-machine area and, after suitable aeration and cooling, the latter is returned into the system. As in the heavy mechanised system, the bulk sand is used as a backing sand, while prepared facing sand which has been delivered from the

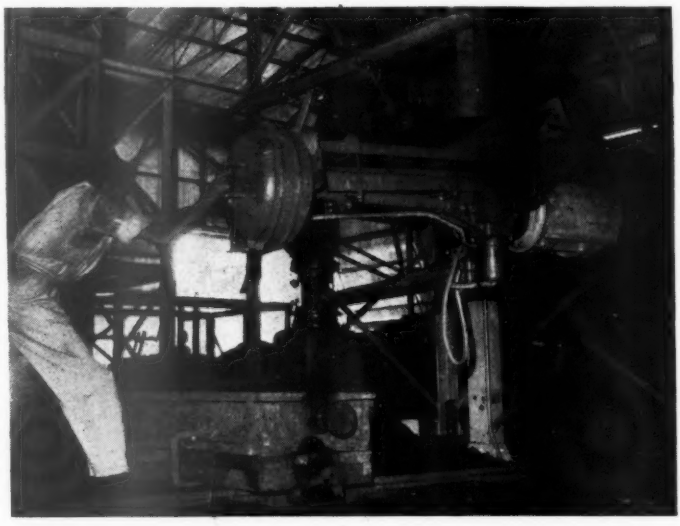

FIG. 12.—SANDSLINGER UNIT IN THE HEAVY MECHANISED PLANT.

FIG. 13.—MECHANISED PLANT FOR THE SMALLER IRON CASTINGS.

central sand plant is added to the pattern. The casting of the boxes takes place along one of the arms of the roller conveyor by means of an overhead runway and an 8-cwt. covered ladle.

The situation of the plant is such that it has easy access to the central core-making section. Inside the area, enclosed by the roller conveyor and in the immediate vicinity of the cupolas, a certain amount of plate and jobbing moulding takes place, the moulding and casting procedure conforming to the general timetable of the mechanised plant. The average weight of casting undertaken in this area can be extremely low and one of the objects of isolating this light, mechanised moulding from the main mechanised plant was so that the sand conditions could be made suitable so as to produce the high finish which is generally desired on light castings.

Core-making Section

Large numbers of cores are required for the various mechanised sections, and where these cores are of a small size, or can be made on a repetition basis, they are manufactured in the centralised core-making section. This section, which receives its own sand supply, is surrounded by an overhead, pendulum conveyor which in turn brings the sand to the core makers, takes the cores to the vertical core stoves, delivers the baked cores to the inspection and storage departments, to the main mechanised section and, lastly, returns the empty core plates back to the core makers. Adaptable turn-over core-making machines are installed (Fig. 14), and at a later date experiments will be carried out to see if cartridge core blowing is justified for some of the small intricate cores which

FIG. 14.—CORE-MAKING SECTION SHOWING THE TURNOVER MACHINES.

will be required as the light mechanised section develops.

Drying Stoves

A series of drying stoves are erected at the ends of the principal foundry bays. These seven stoves, which were constructed by Burn & Company, Limited, are of an up-to-date design, being fitted for combined coal and coke breeze firing by means of automatic underfeed stokers. In addition to this, secondary air can be provided when required. The stoves have so been constructed (Fig. 15) that no great amount of labour is required for door lifting, bogie removal, etc. The doors are operated by pneumatic cylinders and the bogies are of the "V"-and-ball type, being drawn out or into the stoves by means of a compensated rope gear, the rope slack being counterpoised so that it presents no obstruction. The stoves have proved efficient in operation and, on account of the thermostatic control, require minimum labour to operate. In addition to the stoves just described (which are required for the steel-foundry section, loam moulding and other dry-sand work) two No. 2-size Acme Junior tower stoves are installed in the central core-making plant; these vertical stoves undertake the drying of the sleeper cores and any other repetition cores, being linked to the core-making section by means of the overhead pendulum conveyor. Additional facilities, so that moulds can be dried *in situ*, are present in the form of portable dryers. These portable dryers are also used for ladle drying.

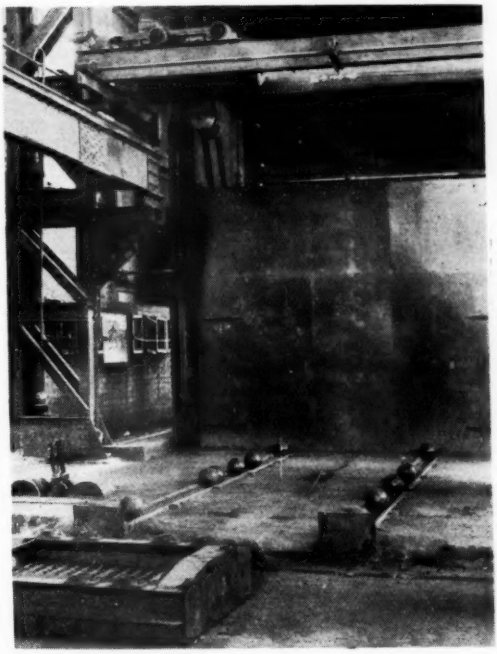

FIG. 15.—STEEL-FOUNDRY DRYING STOVES, SHOWING PNEUMATICALLY OPERATED DOOR LIFT AND COMPENSATED BOGIE DRAW-OUT-AND-IN GEAR.

Steel Foundry

The steel-foundry section in many respects is operated as formerly, with the exception of a machine-moulding section which is incorporated into the main sand plant as previously described. This machine-moulding section has its own knock-out and has been designed so that it can quickly be expanded. A 1,500-lb. Herman turn-over moulding machine (Fig. 16) is installed, and is engaged mainly on the production of buffers, buffer casings and axle boxes. Already, this has had a marked influence on the foundry production and has not only eliminated a considerable portion of the hand methods formerly employed, but has produced adequate stocks of castings so that the machine shop is now in a position to maintain continuous production.

The new core stoves in the steel-foundry section have proved themselves extremely efficient, and the underfeed stoker method of firing has proved par-

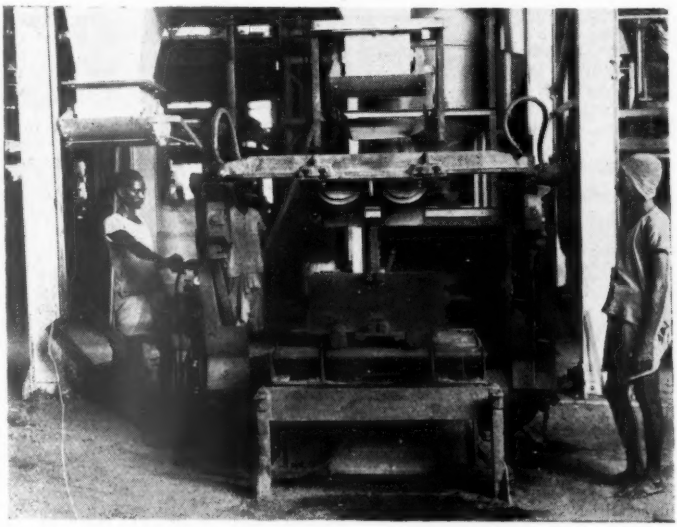

FIG. 16.—BUFFER-CASE MANUFACTURE IN THE STEEL FOUNDRY ON A HERMAN TURNOVER MACHINE.

Burn's Court Foundry Reconstruction

ticularly satisfactory for the purpose intended, while the installation of the pneumatically-operated remote-controlled doors, coupled with the compensated bogie draw-in and draw-out gear, makes these stoves more than comparable with the latest British or American practice. The annealing of the castings is carried out in an oil-fired bogie-type annealing furnace (Fig. 17), designed by the Incandescent Heat Company, Limited, addition to these, the usual small pneumatic tools are installed at convenient points.

Two large self-contained chamber-type shot-blast units have been installed for dealing with some of the larger steel castings. In the case of the main mechanised plant, a continuous overhead conveyor transports the castings the full length of the foundry at such a speed as to give a satisfactory cooling time. The castings then pass continuously through a two-wheel Wheelabrator unit which imparts a perfect skin finish, at the same time removing all adhering sand.

FIG. 17.—STEEL-FOUNDRY BOGIE-TYPE ANNEALING FURNACE AND GROUPS OF CASTINGS.

with a capacity equal to that of the potential foundry output. It is proposed, at a later date, to install a small 3-phase direct-arc electric furnace to minimise shutdowns during the open-hearth furnace relining period and at the same time to place the foundry in a position to supply castings to high-alloy specifications.

The fettling section, as related to the different foundry departments, has been equipped with modern high-speed duplex snagging grinders, overhead swing-frame grinders and High-Cycle portable units. In The castings are then off-loaded on to continuous benches so that the line-production system can be applied to the grinding and hand operations, the castings finally arriving at the loading station where they are either despatched or stored, whichever being convenient. At this point, the castings can be loaded on to another overhead conveyor which transports them from either the end of the fettling benches, or the storage area, to the wagons. During this transfer, the castings are raised to a convenient loading height so that they can be passed straight through the wagon doors.

MAIN CONTRACTORS FOR BURN'S COURT FOUNDRY

Miscellaneous plant and structural steelwork ..	Burn & Company, Limited
Overhead electric cranes	Vaughan & Company, Limited
Main sand plant and light mechanised plant ..	August's, Limited
Heavy mechanised plant	Hepburn Conveyor Company, Limited
Cupola designs, receiver ladles and pouring ladles	E. A. Roper
High-speed grinding and swing-frame grinding equipment	Luke & Spencers, Limited
Moulding machines	Pneulec, Limited Stone-Wallwork, Limited British Moulding Machine Company, Limited

MR. IVAN LAMOUREUX, writing in the current issue of *La Fonderie Belge*, states that there have recently been two explosions in cupolas due to the accidental introduction of projectiles. In one case there was no harm done beyond structural damage to the furnace, but in the second one, two of the operators received superficial burns.

VOWLES ALUMINIUM FOUNDRY COMPANY, LIMITED, are planning to extend their works at Bank Street, West Bromwich.

MR. ALFRED IDDLES, president of the Babcock & Wilcox Company, New York, has been appointed a director in place of MR. A. G. PRATT, who has resigned his seat on the board.

Leaders of the Industry

Kenneth Marshall

Mr. Kenneth Marshall, M.A., the director of the Joint Iron Council and the Council of Ironfoundry Associations, comes from a Birmingham family and was educated locally at the famous King Edward's School. He participated very fully in the activities of the school, playing for the first football XV and the cricket second XI, and winning many athletic events. He was secretary of the school's scientific society and was awarded the City of Birmingham Major Scholarship in Natural Sciences. The year 1927 was the beginning of his university career, and until 1930 Mr. Marshall was an undergraduate at St. John's College, Cambridge. Here he took up rowing, hockey, and, in 1929, skated from Cambridge to Ely. He went down from Cambridge having gained 2nd class honours in Economics and Politics and the award of an M.A. degree. His industrial career was opened as an apprentice at the Sheffield, Scunthorpe and Workington branches of the United Steel Companies. Here, he made a special study of costing and production planning, and then under the care of the late Dr. T. Swinden, was initiated into the science of metallurgy and the art of steelmaking. Commercial experience came next in the Birmingham and London offices of this company, pre-cutting steels and hematite pig-irons being his special field of activity. In 1936, he joined the Birmingham sales staff of Brown Bayley's Steelworks, Limited. During this period he became an active member of the Junior Chamber of Commerce and was chairman of the Industrial Committee. This type of work attracted him increasingly. He found himself lecturing on economic subjects at evening class and publicly. Moreover, he made time to read for the Bar and eat dinners at Lincoln's Inn. Then came the war, and after volunteering for active service, Mr. Marshall discovered that the authorities deemed it best that he should work at the Ministry of Supply as technical assistant on gun and carriage production, dealing with material contracts and specifications. Very soon, however, he was placed in charge of a new department which had to procure supplies for the production of wheeled vehicles. Shortages and new designs involved all kinds of changes and collaboration with industry—especially the makers of motor-cars—to adjust conditions. The next promotion came in 1943, when Mr. Marshall was appointed Deputy Superintendent, Technical Applications of Metals. Aided by a staff of metallurgists, he had the responsibility of advising the service departments on the choice of materials, taking cognisance of availability and economy. Whilst so engaged, he initiated a number of changes in the drawing office, inspection and contracting procedures which had the effect of speeding-up production and eliminating rejections at this vital stage of the war.

MR. KENNETH MARSHALL, M.A.

Leaving the Ministry in 1946, he was that year called to the Bar. He entered Patent Chambers in the Temple. Then the following year he joined Sir Leonard Browitt at the National Union of Manufacturers to assist him in the organisation of an export advisory service. The work culminated in the presenting to the President of the Board of Trade of a report of all the various factors which were impeding exports.

The last phase of Mr. Marshall's career is well known, for on February 1, 1948, he was appointed director of the Joint Iron Council. Since that time, the post has been expanded to embrace the direction of the Council of Ironfoundry Associations and the Pig Iron Producers' Association. He still has many other activities, which include Fellowship of the Royal Economic Society; Associate Membership of the Institute of Industrial Administration; Membership of the Grand Council and the Home and Economic Policy Committee of the Federation of British Industries; trusteeship of the National Foundry Craft Training Centre, and membership of the Council of the British Cast Iron Research Association and of the Institute of British Foundrymen.

Nodular Cast Iron

Mr. O. Carlsson, writing in the current issue of the Swedish foundry journal *Gjuteriet*, has summarised his work in the following statement:—

In order to produce nodular cast iron, heats have been made by remelting of Swedish charcoal pig-iron. The irons were treated with Mg-Cu-Mg (20 per cent. Mg) and Ni-Mg (25 per cent. Mg) respectively. The tensile strengths obtained were 32 tons per sq. in. and higher. The yields of Mg were 20 to 34 per cent. One heat was made from charcoal pig-iron and steel scrap. The sulphur content of this heat was raised to 0.035 per cent. by means of ferro-sulphur. The iron was treated with Ni-Mg, followed by strong inoculation, rendering an increase of Si of 1 per cent. A tensile strength of 38 tons per sq. in. maximum, elongations of up to 14 per cent. and Charpy impact values of up to 12 kg.-cm. per sq. mm. have been obtained. Heat-treatment just below the critical resulted in higher elongation and impact values, but lower tensile strength. Heat-treatment at 900 deg. C. gave a tensile strength of close to 57 tons per sq. in. The yield of Mg was 21 to 37 per cent. A calculation indicates that the cost of nodular cast iron seems to be of about the same order as that of malleable iron.

Commonwealth Engineering Conference

The second Commonwealth Conference of Representatives of Engineering Institutions is to be held in Johannesburg in April, and the three major engineering institutions of this country are to be represented by their presidents and secretaries as follow:—The Institution of Civil Engineers, Mr. V. A. M. Robertson, C.B.E., M.C. (president), and Mr. E. Graham Clark, C.B.E., M.C. (secretary); the Institution of Mechanical Engineers, Dr. S. F. Dorey, C.B.E., F.R.S. (president), and Sir Henry Guy, C.B.E., D.Sc., F.R.S. (secretary); the Institution of Electrical Engineers, Prof. E. B. Moullin, M.A., Sc.D. (president), and Mr. W. K. Brasher, M.A. (secretary).

These officers, accompanied by their ladies, are sailing to-day on the R.M.S. Capetown Castle from Southampton, and whilst in South Africa will take the opportunity of meeting members of their own institutions in the Union and in Southern Rhodesia. The party will return to England in May.

Institute of British Foundrymen — *June 6 to 9*

Annual Conference at Buxton

The 47th Annual Conference of the Institute of British Foundrymen will be held at Buxton, Derbyshire, from June 6 to 9 inclusive. This Conference is being organised by a committee representative of several branches of the Institute and hospitality is being provided by the members of the branches adjacent to Buxton, namely the Birmingham, East Midlands, Lancashire and Sheffield Branches. The International Committee of Foundry Technical Associations and its associated committees have accepted the Institute's invitation to hold their 1950 meetings at Buxton, on Monday and Tuesday, June 5 and 6. Most of the visitors will stay and take part in the Conference. Although Buxton is not an industrial centre it is within easy access of several industrial areas and visits have been arranged to important foundries in those areas.

Members are requested to note carefully the following points:—

Hotel Accommodation.—It has been found that there is considerable demand for hotel accommodation in Buxton during the month of June from regular visitors to the resort. A number of hotels have, however, promised to set aside a proportion of their rooms for members of the Institute provided application is made before April 22. At this Conference, all bookings will be effected by the members themselves direct to the hotels and not through the head office of the Institute. In their own interests, members are requested to book their rooms at the earliest possible date as those who book later may have some difficulty in finding accommodation.

It should also be noted that:—

(*a*) Unlike hotels in commercial centres, there is a high proportion of double-bedded and twin-bedded rooms, and members who can share rooms are requested to do so in their own and the general interest. There is only a small number of single rooms available and

(*b*) the accommodation which is being held is for the full period of four nights, Tuesday, Wednesday, Thusday and Friday, and it is hoped that most members and ladies will book for the full period.

Meeting Accommodation.—All the Conference meetings will be held at the Spa Hotel which overlooks the Pavilion Gardens. All social functions will be held at the Palace Hotel, which is near the station and stands on an eminence overlooking the town. These hotels are under associated management.

Works Visits.—The Institute is particularly indebted to the companies who are inviting members to inspect their works. Most of these companies are also extending hospitality for lunch and in some cases, for tea.

Ladies.—In addition to the items arranged specially for ladies, they are also invited to accompany members at various social functions as indicated on the general programme.

Day Visitors.—The Institute is prepared to arrange special buses for those members and ladies who live within easy distance of Buxton and wish to stay at their own homes, or who wish to visit the Conference for a limited number of functions only. The arrangements will depend upon the number signifying their intention of availing themselves of these facilities.

Preprints of Papers to be presented to the Conference will be available to all members whether they are attending or not. Application for copies may be made to the Institute, when booking for the Conference or separately.

Punctuality.—Members and ladies are reminded that all the arrangements are worked to a very close schedule and any slight delay may completely dislocate the rest of the day's arrangements. Punctuality is therefore essential and members and ladies are requested to attend all functions at least five minutes before the advertised times.

Reply Forms.—It is absolutely essential that those who intend to participate should return their reply forms as soon as possible and in no case later than May 13.

Tickets.—Unless requested to the contrary, tickets will be sent by post in advance of the Conference together with a copy of the Conference handbook in which final and fuller details of the programme will be included. Tickets should be carefully checked upon receipt. Distribution of tickets will not be commenced until the latter part of May, irrespective of the date of receipt of the reply forms. Members who do not wish to receive their tickets by post may collect them at the Conference office in exchange for a registration card which will be sent in acknowledgment of the reply form, if it is indicated that the tickets are not required by post.

Conference Office.—The Conference Office will be established on Tuesday, June 6, in a room on the first floor of the Spa Hotel, Buxton, which is about five minutes walk from the railway station and two or three minutes walk from the Crescent. Communications prior to this date should be addressed to the Institute's head office, St. John Street Chambers, Deansgate, Manchester, 3. The Conference Office at the Spa Hotel will be open for the issue of tickets, booklets, papers, information, etc., at the following times:—

Tuesday, June 6, 2 p.m. to 5.30 p.m.; Wednesday, June 7, 9 a.m. to 12.30 p.m, and 2.30 p.m. to 5 p.m.; Thursday, June 8, 9 a.m. to 12.30 p.m. and 2.30 p.m. to 4 p.m. The telephone number of the Spa Hotel is: Buxton 1261, and the Conference Office extension is No. 100.

Programme

TUESDAY, JUNE 6. Afternoon. Council and committee meetings at the Palace Hotel. Open to Council and committee members only who will receive particulars later. Members and ladies make their own arrangements for dining at their hotels.

8.15 p.m. to 11.30 p.m. Reception and Dance by invitation of His Worship the Mayor of Buxton and the Mayoress at the Pavilion. Entrance St. John's Road. Welcome by His Worship the Mayor (members and ladies, evening dress optional).

* Times and detailed arrangements are subject to revision. Final arrangements will be shown in the Conference Handbook, which will be sent to all members and ladies participating.

WEDNESDAY, JUNE 7

9.15 a.m. Annual General Meeting in the Ballroom of the Spa Hotel, Buxton (members only). Presentation of Awards.
10.45 a.m. Adjourn for Coffee.
11.00 a m. Presidential Address by Mr. J. J. Sheehan, B.Sc., A.R.C.Sc.I.
11.30 a.m. Edward Williams Lecture: "Gases and Steel," to be delivered by Sir Andrew McCance, LL.D., D.Sc., F.R.S.
12.30 p.m. Adjournment.
1.00 p.m. Luncheon, Palace Hotel (members and ladies).
2.30 p.m. Technical Sessions at the Spa Hotel.
Session A. In the ballroom . . . Papers Nos. 963, 964, 965.
Session B. In the drawing room . . . Papers Nos. 966, 967, 968.
4.00 p.m. Buffet Tea (by invitation).
5.00 p.m. Conference Adjourns.
7.00 p.m. Reception by the President and Mrs. Sheehan at the Palace Hotel prior to the Annual Dinner.
7.30 p.m. to 1.00 a.m. Annual Dinner at the Palace Hotel, followed by dancing (members and ladies, evening dress and decorations).

THURSDAY, JUNE 8

9.30 a.m. Technical Sessions at the Spa Hotel.
Session C. In the ballroom . . . Papers Nos. 969, 970.
Session D. In the drawing room . . . Papers Nos. 971, 972, 973.
10.45 a.m. Adjournment for coffee.
12.30 p.m. Conference Adjourns.
1.00 p.m. Luncheon at the Palace Hotel (for members, and ladies not participating in the ladies' excursion).
2.30 p.m. Technical Sessions at the Spa Hotel.
Session E. In the ballroom . . . Papers Nos. 974, 975.
Session F. In the drawing room . . . Papers Nos. 976, 977.
4.00 p.m. Buffet tea by invitation.
5.00 p.m. Conference Adjourns.
Members and ladies make their own arrangements for dinner and are requested to give notice the previous day to their hotels of their intention to dine at their hotel.
7.45 p.m. Visit to Buxton Repertory Theatre (members and ladies). Title of play to be announced later; it will probably be "The Happiest Days of Your Life." On conclusion of the play, those attending will pass to the President's Night at the Palace Hotel.
8.00 p.m. to midnight President's Night at the Palace Hotel (not evening dress). An informal evening, with entertainment from 10.00 p.m.

FRIDAY, JUNE 9

Members may participate in one only of the following visits or groups of visits:—Motor coaches will depart from the Crescent, Buxton, at the times given.

8.45 a.m. 1. (*a*) The Butterley Company, Limited, Ripley (general engineering, jobbing and mechanised) (morning).
Luncheon by kind invitation of the Butterley Company.
(*b*) Markham & Company, Limited, Chesterfield (brass and ironfoundries, castings up to 40 tons) (afternoon).
Return to the Crescent, Buxton at about 6.00 p.m.

9.00 a.m. 2. The Staveley Iron & Chemical Company, Limited, Staveley, near Chesterfield (blast furnaces, chemical works, extensive spun-pipe plants—sand- and metal-spun—general foundries). An all-day visit.
Luncheon and Tea by kind invitation of the Company.
Return to the Crescent, Buxton, arriving at 6.00 p.m.

9.15 a.m. 3. Sheepbridge Engineering Company, Limited, Chesterfield (centrifugal castings for cylinder liners and piston rings, alloy sand castings, machine shops).
Luncheon by kind invitation of the Company.
After lunch, coaches proceed to Sutton-in-Ashfield and visit the Sutton-in-Ashfield works of the company (centrifugal and sand castings in high-alloy heat-resisting and stainless steel, also in nickel and nickel-base alloys. H.F. melting furnaces, machine shops).
Tea by kind invitation of the Company.
Return to the Cresecent, Buxton, at about 6.00 p.m.

9.15 a.m. 4. Hadfields, Limited, East Hecla Works, Sheffield (large steel foundries producing all descriptions of steel and manganese steel castings). An all-day visit.
Luncheon at the Royal Victoria Hotel, Sheffield, by invitation of the Birmingham, East Midlands, Lancashire and Sheffield Branches.
Return so as to arrive at the Crescent, Buxton, at about 6.00 p.m.

9.15 a.m. 5. (*a*) Billington & Newton, Limited, Longport, Stoke-on-Trent (non-ferrous manufacturers and founders) (morning).
Luncheon by kind invitation of the Company.
(*b*) T. M. Birkett & Sons, Limited, Thomas Street, Hanley, Stoke-on-Trent (non-ferrous founders and engineers) (afternoon.)
Tea by kind invitation of the two Companies.
Returning to the Crescent, Buxton, at about 5.45 p.m.

7.30 p.m. for 8.00 p.m. to 1.00 a.m. Dinner Dance at the Palace Hotel, Buxton (ladies and members, evening dress optional).

Ladies' Programme

TUESDAY, JUNE 6

8.00 p.m. to 11.00 p.m. Reception by His Worship the Mayor of Buxton and the Mayoress at the Pavilion (members and ladies, evening dress optional).

WEDNESDAY, JUNE 7

10.45 a.m. Morning Coffee in the ballroom of the Palace Hotel.
11.15 a.m. to 12.15 p.m. Mannequin Parade in the ballroom, Palace Hotel, by Elsie Battle, Limited, Terrace Road, Buxton.
1.00 p.m. Luncheon, Palace Hotel. Afternoon Free.
7.00 p.m. Reception by the President and Mrs. Sheehan, prior to the Annual Dinner.

7.30 p.m. to 1.00 a.m. Annual Dinner at the Palace Hotel followed by dancing (evening dress).

THURSDAY, JUNE 8

11.00 a.m. Depart from the Crescent, Buxton, for a tour to Chatsworth. 12.30 p.m. Luncheon at the Devonshire Arms Hotel, Baslow.

Depart from Baslow for Chatsworth at 1.45 p.m. Tour of Chatsworth House, departing at 4.00 p.m. and arriving at Buxton at 5.00 p.m.

7.45 p.m. Visit to Buxton Repertory Theatre (members and ladies). On conclusion of the play, the party will pass to President's Night at the Palace Hotel.

8.00 p.m. to midnight President's Night at the Palace Hotel, informal entertainment from 10.00 p.m.

FRIDAY, JUNE 9

10.45 a.m. Depart by motor coach from the Crescent for factory visits at Stoke-on-Trent.

12.30 p.m. Luncheon at Ash Hall Hotel, Stoke-on-Trent.

1.45 p.m. Divide into smaller parties each of which will visit one only of the following works which carry on the manufacture of china ware*:—

(1) W. T. Copeland & Sons, Limited.
(2) Josiah Wedgwood & Sons, Limited, Barlaston.
(3) Mintons, Limited.
(4) Shelley Potteries, Limited, Longton.

Ladies visiting Potteries return to Ash Hall Hotel for tea by invitation of the Conference committee.

(5) Simplex Electric Company, Limited, Blythe Bridge, near Stoke, manufacturers of all kinds of electrical domestic equipment, stoves, electric irons, etc. Tea by kind invitation of the Company.

Buses return to the Crescent, Buxton, at 5.30 p.m. to 6.00 p.m.

7.30 p.m. for 8.00 p.m. to 1.00 a.m. Dinner Dance at the Palace Hotel, Buxton (ladies and members, evening dress optional).

Programme of Papers

WEDNESDAY, JUNE 7

2.30 p.m. to 5.00 p.m. Two simultaneous sessions:—

Session A (in the ballroom, Spa Hotel, Buxton):—

No. 963 "Some Properties and Applications of Spheroidal-graphite Cast Iron," by A. B. Everest, Ph.D., B.Sc., F.I.M. (member).

No. 964 "The Properties of Cast Iron at Sub-atmospheric Temperatures," by C. N. J. Gilbert (British Cast Iron Research Association).

No. 965 "Experiences in the Application of Spectrographic Analyses in the Grey-iron Foundry," by E. J. Ronnie and M. M. Hallett, M.Sc., F.I.M. (member).

Session B (in the drawing room, Spa Hotel, Buxton):—

No. 966 "Non-ferrous Investment Casting," by Hiram Brown. (Exchange Paper from the American Foundrymen's Society).

No. 967 "Sand-cast Test-bars for Copper-base Alloys," by O. R. J. Lee and B. W. Peck (British Non-Ferrous Metals Research Association).

No. 968 "Some Experiments in Sand Casting of Conductivity Copper," by W. H. Glaisher (British Non-Ferrous Metals Research Association).

THURSDAY, JUNE 8

9.30 a.m. to 12.30 p.m. Two simultaneous sessions:—

Session C (in the ballroom, Spa Hotel, Buxton).

No. 969 Report of Sub-committee T.S.23—Repair and Reclamation of Grey-iron Castings by Welding and Allied Methods.

No. 970 Report of Sub-committee T.S.26—Repair and Reclamation of Non-ferrous Castings.

Session D (in the drawing room, Spa Hotel, Buxton).

No. 971 "The Fluidity of Steel," J. R. Worthington, B.Sc. (British Iron and Steel Research Association).

No. 972 "The Effect of Liquid Metal Properties on the Casting Fluidity of Alloys," by Dr. V. Kondic (member).

No. 973 "The Deformation Characteristics of Five Grey Cast Irons at 400 deg. C. and 500 deg. C." C. R. Tottle, M.Met. (associate member).

2.30 p.m. to 5.00 p.m.

Session E (in the ballroom, Spa Hotel, Buxton).

No. 974 "A Comparison of Foundry Conditions in Britain and South Africa," by H. G. Goyns (South African branch).

No. 975 "The Rationalisation of Sand Preparation," by J. F. Goffart. (Exchange Paper from *L'association Technique de Fonderie de Belgique*).

Session F (in the drawing room, Spa Hotel, Buxton).

No. 976 "Testing the Metal or Testing the Castings—Some Notes on the New Swedish Cast-iron Specifications," by E. Lissell.

No. 977 "Similarities between Steels and Aluminium Bronze," by H. Laplanche. (Exchange Paper from *L'association Technique de Fonderie*).

Last date for receiving Conference Applications May 13.

* IMPORTANT. The various china manufacturers are compelled to limit the invitation to very small groups (in one case, as few as six) less than half of the ladies can therefore be accommodated on visits 1 to 4. Those who particularly desire to visit a pottery are requested to make early application.

US Steel Output Down

According to the American Iron and Steel Institute, February steel production totalled 6,782,448 tons, a reduction of 14½ per cent. on the January output of 7,930,372 tons. Output in February, 1949, was 7,480,724 tons. The prolonged strike of American miners is stated to have been largely responsible for the lower output last month.

Now that coal deliveries have been resumed, however, production in the steel industry is expected to show a marked improvement this week. Operations at the mills this week are estimated at 89.8 per cent. of the rated capacity, with output at 1,711,800 tons, compared with 73.5 per cent. and 1,401,100 tons last week.

Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

NODULAR CAST IRON

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—The Authors of the Paper "Nodular Cast Iron," which appeared in the issue of March 9, are to be congratulated on their valuable contribution to the literature and on their sober, practical, conclusions. However, in connection with the mechanism of the formation of graphite spherulites they have shown less caution in underlining the completely unproved theories of De Sy. Such theories are dangerous in that they tend to be accepted as proved before this is in fact the case and so the truth is often hidden.

De Sy has suggested that certain nuclei are present in molten cast iron and that these nuclei, by virtue of their crystal structure, promote the formation of flake graphite. It should be noted that we have no direct information that such nuclei exist; still less do we know their compositions or their crystal structures. De Sy proposes that elements such as magnesium react with these nuclei, giving other nuclei of different crystal structure. Again this is purely hypothetical and in fact ignores certain observations.

Although we have not referred to the fact as yet in the literature, provided the sulphur content of the iron is low spherulitic, nodules can be produced in cast iron merely by a critical rapid cooling, but Williams and the present writer have already shown this to happen in nickel-carbon alloys. The conclusion to be drawn from this is that the presence or absence of any particular nuclei is not always a necessary condition for the formation of graphite spherulites, provided the appropriate solidification sequence is obtained.

The radial structure of a graphite spherulite is highly suggestive, however, of growth from a central nucleus, and it is easy at first sight to imagine that nuclei can be seen in the centres of the spherulites. Vennerholm, Bogart and Melmoth are apparently satisfied that they can see these nuclei, but the evidence they produce is not very convincing for the following reasons.

All graphite spherulites produced by whatever method or in whatever material (and there are at least seven methods of producing graphite spherulites and they can be produced in three completely different alloys) appear to have a nucleus which differs from the surrounding graphite fibres. If the geometry of the spherulitic structure is considered, the occurrence of this "apparent nucleus" can be explained without invoking any special nucleus theory.

A graphite spherulite consists of graphite crystallites radiating from a common centre. The closely packed planes in these graphite crystallites are oriented at right angles to the direction of growth, that is, at right angles to the radii of the spheroid. Now any metallographic section will cut through a very large number of spherulites either above or below their centres and only in a few cases will the polished surface cut directly through the centre of the spherulite. In the former, more general, case, due to the orientation of the spherulites, the microscopically apparent centre of the spherulite will show crystallites of graphite cut parallel, or almost parallel, to the closely packed basal planes. Light incident on these basal planes is reflected in a manner quite different from light incident on graphite at some angle to the basal plane. Sections cut parallel to the basal planes are difficult to polish due to slip along the basal plane. Hence the apparently irregular arrangement at the centres of a large number of graphite spherulites. Basal sections of graphite give metallic specular reflections and no optical anisotropic effects, whereas sections at an angle to the basal plane appear non-metallic and show optical anisotropy such as pleochroism. Thus, in general, the centres of graphite spherulites in metallographical specimens will appear to differ from the bulk of the spherulites. Nevertheless, the material at the centre of the spherulites need only be graphite.

Theories involving nuclei have proved somewhat misleading in the past, and it is the purpose of the present writer to point out that the nucleus theory put forward by De Sy is not supported by any experimental evidence and in fact ignores much of the evidence. Furthermore, the apparent nucleus at the centre of the spherulites can be explained by simple geometrical considerations. It is not suggested by the present writer that nuclei are not present at the centres of spherulites, but rather that the apparently different material at the centres of spherulites is only graphite. Nuclei need not be microscopically visible and in many cases they are probably sub-microscopic.

Nuclei and inclusions are talked of with a considerably misleading assurance of their existence and their nature. As far as cast iron is concerned, it is true to say that we have no evidence to indicate that the melt contains solid oxides or silicates which function to influence the graphite pattern. We have some very indirect evidence that sub-microscopic lattice residues of graphite may exist, but beyond this we know nothing.

Yours, etc.,

H. MORROGH.

The British Cast Iron Research Association.
Alvechurch, Birmingham.
March 14, 1950.

Labour Direction

Informing the House of Commons of the Government's decision to withdraw the Control of Engagement Order as from the week ending March 11, the Minister of Labour (Mr. George Isaacs) said that the distribution of man-power was now such that the Order could safely be withdrawn. There had been progressive relaxations in administration of the Order and for long the practice of giving directions to specified work, in order to support its administration, had been almost entirely in abeyance. The Minister reminded the House that, at the end of last year, the "ring fences" round coal mining and agriculture were abolished.

"We can now take the final step of abolishing this control altogether, and it will no longer be compulsory for engagements of labour to be made through the employment exchanges of the Ministry of Labour." Mr. Isaacs said that the exchanges would remain freely at the service of employers and workers, and it was hoped that they would, for their own advantage, make the fullest use of them.

Diesel-electric Locos for Ceylon

The Brush Electrical Engineering Company, Limited, of Loughborough announce that they have received an order from the Ceylon Government Railways, through the Crown Agents for the Colonies, for 25 main-line diesel-electric locomotives of 1,250 B.H.P. each, the largest single order for diesel-electric locomotives yet placed in this country. The locomotives will be of the AIA-AIA type with a maximum speed of 55 m.p.h. and will be fitted for multiple-unit working, the power equipment being the Mirrlees JVS.12, 12-cylinder, pressure-charged, vee-type engine direct coupled to a Brush 635 kw. generator, the four traction motors having a continuous rating of 193 B.H.P. each. The mechanical parts will be built in association with W. G. Bagnall, Limited, of Stafford.

The Institute of British Foundrymen

Annual Meeting of the Scottish Branch

The annual meeting of the Scottish branch of the Institute of British Foundrymen was held on March 11, Mr. R. S. M. Jeffrey in the chair. Following formal presentation of the minutes of the 1949 meeting, the honorary secretary, Mr. John Bell, was asked to present his report.

Secretary's Report

Membership

This year no spectacular advance in membership can be recorded. The branch is just holding its own. Actually there is a net decrease of one and this is caused chiefly by a reduction in the number of associate members. It must be remembered that whereas, under the old bye-laws, the qualifying age for this grade was 21 years, it is now, except in rare cases, 27 years. This prevents application at an early age for associate membership and as wastage remains fairly constant, taking one year with another, this restriction in the number of associate members can be expected to continue for some years to come. The new bye-laws may make things, numerically and financially, difficult for the Institute for a time, but it is a deliberate choice and nothing this branch can do will alter it. The associate member grade has always been the popular grade in Scotland because membership—and, especially, active membership—has largely come from the men whose jobs are on the foundry floor. Many of them have risen to positions of eminence in the industry and, as they have risen, they have transferred to the higher and more important grade of member. On the other hand the associate grade has never been popular in Scotland. There never have been many, and they seldom remain long in membership.

A comparison between this session and last session shows that, while wastage is almost the same, the admission of new members is substantially down, and when compared with session 1947-48 it is no fewer than 76 down. The branch must be prepared for a decline in membership during the next few years. Last session it lost no fewer than 21 whose names were removed for non-payment of subscriptions, and, while there are only 11 such cases this year, an examination of the arrears table will indicate that, unless the very unusual happens, next session will see another large reduction in membership due to the same cause. To guard against this possibility every effort must be made to attract new entrants. But it will not be easy. And it may be less easy in the near future.

Loss by Death

During the session we had three deaths in our membership. These were Mr. William Bell, Mr. William Hamilton and Mr. William Dick. All of them were well known to many of our members, but while the latter two were best known to our present membership, Mr. Bell was best known to those whose membership goes back to the early days of the branch. He had lived for many years in Maryport, Cumberland. He was a founder member of the branch, was president in session 1919-20, and, in those early days, did much to lay the foundation on which the later success of the branch has been built. Mr. Hamilton had served three years as a member of the branch council.

The honorary secretary announced that the branch had been invited by the directors of Glenfield & Kennedy, Limited, to visit their works in Kilmarnock on May 6, and details would be circulated to members in due course.

In a note concerning the Foundry Information Committee, which exists to popularise the foundry industry through the medium of the daily and technical Press, the secretary intimated that he had accepted responsibility of passing on news from members to the committee and would welcome the receipt of suitable news items or other material from members.

Meetings

Attendances at the branch meetings show a slight falling-off, when compared with last session. The largest attendance was 114, consisting of 75 members and 39 visitors, while the smallest was 77, consisting of 57 members and 20 visitors. The average for the session was 94, of whom 76 were members and 18 visitors. During the session five council meetings were held as against six last session. The highest attendance was 16, the lowest 9, and the average 12.

The success of the joint meetings with the Dundee Institute of Engineers, since this series began, was still further enhanced by the meeting held in Dundee in November, when the branch president, Mr. Jeffrey, gave a Paper on "Modern Light Castings Production." There was a good attendance of local members of the Institute and a fine turnout of the Dundee Engineers while the discussion showed how much our Dundee friends appreciate these joint meetings. The following morning members at the Dundee meeting were the guests of the Keith-Blackman Company, Limited, Arbroath. They were accompanied by Mr. David Whyte, hon. secretary of the Dundee Institute, and after spending the forenoon inspecting the Keith-Blackman works they were entertained to luncheon by the firm. To the directors and staff of the company, and especially to Mr. W. G. Calder, director and works manager, thanks are due for a memorable outing.

Falkirk Section

The work of the Falkirk section was carried on under difficulties during the session. First, Mr. Leith, president, had to go to South Africa and, while he was there, Mr. Goodwin, hon. secretary of the section, was appointed by his firm to a new position in their works in that country. He left Bonnybridge in November. To mark their appreciation of the long and faithful service he had given to the section the members held a social gathering a few days before he left when the opportunity was taken to make presentations to Mr. and Mrs. Goodwin. The presentations were handed over by Mr. Jeffrey, branch president, while Mr. Bulloch, junior vice-president of the section, presided at the gathering. In the absence of Mr. Leith, the Falkirk section was ably guided by Mr. Stewart, senior vice-president, and since Mr. Goodwin's departure, Mr. David Fleming has been appointed hon. secretary.

The branch still retains its interest in the work of the Scottish Engineering Students' Association. This Association is open gratis to all associate members and associates of the Institute who are under 30

I.B.F. Scottish Branch

years of age. For some time the branch was represented on the Students' Council by Mr. John B. Morton, to whom thanks are due for all he has done. He has been succeeded in this post by Mr. Archibald Jamieson.

During the session no Institute Diplomas came to Scotland. Other honours, however, were conferred upon our members. The general council of the Institute awarded the E. J. Fox Gold Medal to Sir Andrew McCance, D.Sc., and the British Foundry Medal to Mr. D. H. Young.

A further honour in which the branch shares is the decision of the general council to confer honorary membership on Mr. John Cameron. Mr. Cameron has been a member of the Institute for many years, and was president of the Institute as long ago as 1925. It is an honour he worthily merits and we rejoice with him in having it conferred upon him.

John Surtees Award

This year the "John Surtees" competitions have again been held in Scotland. So far, no occasion has passed without some entries for these competitions being received, although the Junior competitions have always had the wider appeal. The results of the competitions are:—Senior: Gold Medal, Mr. William Pollock, Kilmarnock; Junior: Equal First, Silver medals, Mr. John B. Bell, Wishaw, and Mr. William Hunter, Wishaw; Supplementary Prize, Mr. William Hamilton, Lesmahagow.

The examiner on this occasion was Mr. Alexander Marshall, a past-president of the branch, who, from his training and experience, was well qualified for the task. Hitherto, Mr. A. Campion had been examiner but this year he felt that the work should go to a younger man, and the choice fell on Mr. Marshall who assisted Mr. Campion on the last occasion, two years ago. We thank Mr. Campion for his long services as examiner in these competitions. He designed their form and set their standard, and his name will always be associated with them. On this occasion we want, especially, to remember his work for the branch and for the Institute as well as his work for the "John Surtees" competitions. In 1910 the Scottish branch was formed by the students who attended his class in the Royal Technical College, and he was president in 1913-14 and 1914-15.

It is with regret that we have to intimate that he met with a serious street accident in Stockton-on-Tees early in February. We wish him a speedy and a permanent recovery.

The only social function held last year was the annual branch dinner. In every way it was a success and it brought session 1948-49 to a splendid finish. The dinner which follows this business meeting will mark the end of the winter activities of this session.

Election of Officers

After the financial report and the auditors' report had been submitted and approved the next business before the meeting was the election of officers. The following were elected (the retiring officers are shown in parentheses).

As *president*: Mr. J. G. Arnott (Mr. R. S. M. Jeffrey); as *senior vice-president*, Mr. R. R. Taylor (Mr. J. G. Arnott); as *junior vice-president*, Mr. A. D. J. Black (Mr. R. R. Taylor); as *members of council*, Mr. E. J. Gordon, Mr. R. McArthur, Mr. D. McHugh and Mr. C. Marsh (Mr. C. B. Doig, Mr. A. Macnab, Mr. W. Montgomery and Mr. A. D. J. Black); as *representatives to general council*, Mr. J. Cameron, Jnr., Mr. A. Marshall, Mr. T. Shanks and Mr. R. R. Taylor (unchanged); as *representative to the technical committee*, Mr. J. McPheat (same), and Mr. J. Bell was re-elected as *honorary secretary*.

Both Mr. N. P. Newman, J.P., and Mr. T. Makemson, M.B.E., president and secretary of the Institute respectively, were present at the meeting. The "Surtees" prizes were presented by Mr. N. P. Newman.

Following the business meeting, Mr. D. Redfern presented a Paper "Loam and Dry-sand Moulding in a Jobbing Foundry."

Annual Dinner

In the evening of the same day was held the annual dinner of the branch at the Grosvenor Restaurant, Glasgow. Mr. R. S. M. Jeffrey presided. After the Loyal Toast, the "City and Corporation of Glasgow" was proposed by Mr. D. C. Orr and Bailie H. A. Browne, C.A., the Senior Magistrate of the City, responded. "The Institute" was proposed by Mr. W. Rennie, J.P. (chairman of Federated Foundries, Limited), and Mr. N. P. Newman, J.P., replied on behalf of the members. The final toast of the evening was that of the "Scottish Branch" and was called by Mr. R. H. Garner, B.Sc. (Eng.), the principal of the Burnbank School of Engineering. To this toast the branch president, Mr. R. S. M. Jeffrey, replied. The evening's programme was concluded with entertainment.

Steel Industry and Youth Training

Last year, during October, the British Iron and Steel Federation organised their second conference on Education and Training in the Steel Industry. The problems in this industry are much more difficult than in most other industries, because there never has been any apprenticeship system. The skilled men—and they really are skilled—on the open-hearth furnaces are men, before they start learning their trade. Lads entering this industry just have to be labourers until they achieve manhood. Of course, in a steel works, there are many male clerks, and this grade received some attention at the Conference which was presided over by Mr. Gerald Steel of the United Steel Companies, Limited. About 130 delegates turned up at Ashorne Hill and though there has been a brochure published (there were a dozen discussion groups organised), much material has obviously been omitted. There were introduced three features, which it can be presumed fell flat. They were: "Training the Junior Operative"—a symposium with rehearsed interruptions; "Training the Foreman," which was presented in the form of a dramatised committee discussion, and "Training the Clerk," presented as a duologue. The report is available at the price of 2s. 6d. from the Federation's office—Steel House, Tothill Street, London, S.W.1.

Scots Apprentices' Awards

John B. Bell and William Hunter, joint winners of the Junior Section of the John Surtees Memorial competition, referred to elsewhere on this page, are both employees of the Clyde Alloy Steel Company, Limited, Craigneuk, Motherwell. Each received a silver medal and a monetary award of two guineas. A third employee of the firm's Craigneuk Works, William Hamilton, of Lesmahagow, received a supplementary award of two guineas in the same competition which this year was open to competitors throughout Scotland.

Mr. Bell and Mr. Hunter are 20 years of age and Mr. Hamilton, recently demobilised, after his period of military service, is 22. All three are apprentice steel moulders and day-release students at the School of Engineering at Burnbank.

New Swing-frame Grinder

Recently, a large number of experiments have been carried out at the works of the English Steel Corporation in Sheffield, where it was established that it was the fine air-borne dust which clings to the periphery of the grinding wheel which usually fouls the air. The heavy swarf normally drops to the ground and is of no danger to the operator.

Luke & Spencer, Limited, of Viaduct Works, Broadheath, Manchester, have designed a new swing-frame grinder fitted with internal dust-exhaust system which complies fully with the Factory Department safety regulations requiring all dust from dry grinding machines to be exhausted to the outside atmosphere.

Exhaust System

Fig. 1 shows an adjustable snout built into the wheel head. The position of this snout can be altered as the abrasive wheel wears down so that all swarf is deflected into the main duct, whilst a baffle plate ensures that no sparks and dust are carried round by the natural draught of the rotating wheel. The baffle plate also controls a safety device which prevents the overspeeding of new wheels; there can be no danger, therefore, of a burst wheel. At the outlet end of the duct, flexible trunking is attached and a suitable fan-dust-exhaust cyclone can be provided if required. A minimum of 800 cub. ft. of air per minute must be exhausted if the mechanism is to operate satisfactorily. If, however, any metallic swarf should fuse inside the main duct, it can easily be cleaned out by removing the inspection cover at the rear of the duct.

Features

The machine is of the suspension type and can be carried from a beam or runway by means of a steel rope at its centre of gravity. Many novel features have been introduced to give lightness, strength of construction and ease of maintenance. Fitted at the front end of the machine is a steel wheel-head carrying a spindle mounted on large-size roller and ball bearings. This spindle carries suitable wheel plates and nut to carry a 16-in. dia. by 2-in. wide by 6-in. hole, high-speed bonded "Borolite" abrasive wheel, running at a periphery velocity of 9,000 surface ft. per min. These wheels, running at nearly twice the speed of the vitrified wheel, give the high production rates required for the rapid snagging of iron, steel and non-ferrous castings and forgings. A swan-necked bracket carries a 7½-h.p. motor which is of the squirrel-cage, totally-enclosed, surface-cooled type, running at a synchronous speed of 1,500 r.p.m.

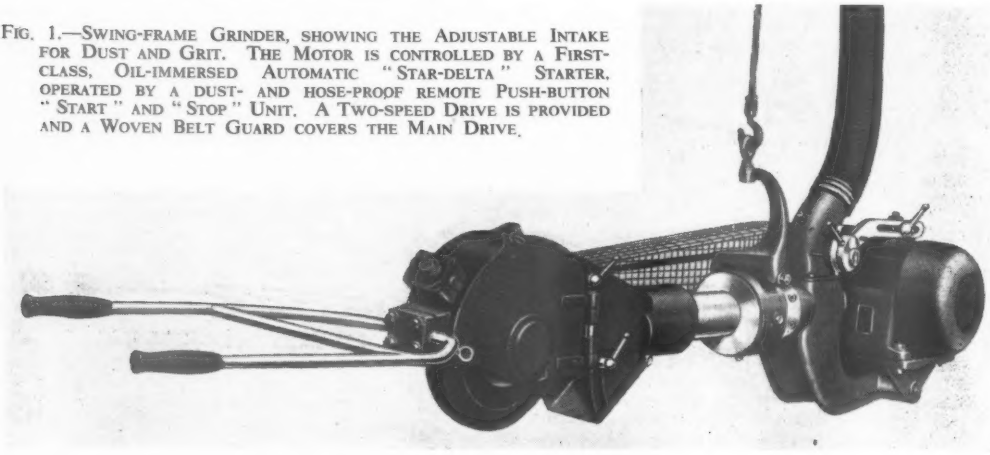

FIG. 1.—SWING-FRAME GRINDER, SHOWING THE ADJUSTABLE INTAKE FOR DUST AND GRIT. THE MOTOR IS CONTROLLED BY A FIRST-CLASS, OIL-IMMERSED AUTOMATIC "STAR-DELTA" STARTER, OPERATED BY A DUST- AND HOSE-PROOF REMOTE PUSH-BUTTON "START" AND "STOP" UNIT. A TWO-SPEED DRIVE IS PROVIDED AND A WOVEN BELT GUARD COVERS THE MAIN DRIVE.

Post-graduate Schools at Sheffield

Sheffield University has set up three new post-graduate schools in technological subjects. The schools—of applied mechanics, physical metallurgy, and mining—will be within the present departments of engineering, metallurgy, and mining, but will have their own heads of department and staffs who will collaborate with the present professors. It is hoped that a start will be made, and the first students enrolled, by October this year.

The schools are intended to help men who have already spent at least two years in industry, following graduation in technological subjects, and others who have distinguished themselves in the study of pure science and want to prepare for technical work. Because of the types of study which will be required to suit men of differing qualification and experience, it is unlikely that specific courses will be laid down for all students.

Reduced Exports

Exports from the United Kingdom in February were valued at £155,700,000, according to provisional figures. This represents a fall of 11 per cent. over the all-time record exports in the first month of the year. There were only 24 working days in February, but when the figures are adjusted to a standard month of 26 working days throughout, exports in February were 4 per cent. lower than in January. They were, however, 11 per cent. higher than the monthly average of 1949 and 11 per cent. above the corresponding month of last year.

February imports are given provisionally at a value of £181,700,000, which is £19,500,000 less than in January, but £19,700,000 higher than in February, 1949. With re-exports at about £5,300,000, the excess of imports (valued c.i.f.) over total exports (valued f.o.b.) was £20,700,000, compared with £19,500,000 for the previous month.

Institute of Vitreous Enamellers

Spring Meeting at Torquay, April 20 to 22

The programme of arrangements for the Spring Conference of the Institute of Vitreous Enamellers to be held in Torquay from April 20 to 22 should be particularly interesting to all in the vitreous-enamelling industry, as the focus of attention is clay, much of which is mined in Dorset and Devon. The Institute have covered, on a number of occasions, visits to enamel works and foundries engaged in the production of all types of articles finished in vitreous enamel, but as clay is of vital importance to enamellers, affecting speed of processing and the results obtained, the council feel particularly pleased in being able satisfactorily to arrange, through the president, Dr. Webb, and by courtesy of Watts, Blake, Bearne & Company, Limited, a visit to their clay mines at Newton Abbot. Members will be shown the clay in all its stages—from the mine face to the finished product.

This visit will be supported by a Paper, given by Dr. Webb himself, on clays, and it is certain that much valuable information will be made available to enamellers.

The Paper on vitreous enamelling of light alloys is important, as it deals with modern development. It will be presented by an expert on this new finish, and the council would appreciate submission of questions and points of view to be dealt with by the lecturer. A works visit dealing with the handling and use of clay will be made through the courtesy of the directors of Candy & Company, Limited, and will give additional knowledge to members.

The Council of the Institute is satisfied that the programme presented is a valuable contribution to enamelling knowledge. It is, however, of major importance that all members attend, and see for themselves what the works visits have to offer, hear the Papers, which are presented by skilled lecturers with both practical and technical knowledge of the subject, and take an active part in the discussions. The Council relies on members' support in this connection, and as it is anticipated that many members will bring their ladies with them, social arrangements will be made according to the numbers attending.

Programme

Thursday, April 20

At Torre Abbey Mansion House.

10.0 a.m.: Paper, "Vitreous Enamelling of Light Alloys," by R. P. Fraser, O.B.E., A.R.C.S., D.I.C., F.I.B.P., followed by discussion and question box.

12.45 p.m.: Lunch at the Imperial Hotel.

1.45 p.m. for 2 p.m.: Leave the Imperial Hotel by coach for a visit to the pottery works of Candy & Company, Limited, Heathfield, Newton Abbot.

5.0 p.m.: Return to Torquay. Evening free.

Friday, April 21

At Torre Abbey Mansion House.

10.0 a.m.: Paper, "Clays," by Dr. H. W. Webb, O.B.E., D.Sc., F.R.I.C., M.I.Chem.E., followed by discussion and question box.

12.45 p.m.: Lunch at the Imperial Hotel.

1.45 p.m. for 2 p.m.: Leave the Imperial Hotel by coach for a visit to the works of Watts, Blake, Bearne & Company, Limited, Newton Abbot (clay mines).

5.0 p.m.: Return to Torquay.

(*Continued at foot of next column.*)

Effect of Mould Materials on the Rate of Solidification of Grey Cast Iron*

Sub-committee T.S.21 of the Technical council of the Institute of British Foundrymen was set up in 1947 to examine the influence of mould materials on the rate of solidification of grey cast iron, using the "interruped freezing" or "slush casting" method. This Sub-committee has recently prepared its final report. Although this is somewhat negative, inasmuch as few data have been obtained to show the effect of moulding materials on solidification rate, it is thought that some of the information obtained is worthy of publication as a record of work carried out in this field.

Details of the Method

The "interrupted-freezing" method employed by the Sub-committee has been used by other investigators to study the rate of solidification of metals and alloys. Essentially, this method consists of pouring metal melted under carefully controlled conditions into a test mould and, after a pre-determined time interval, during which solidifications has begun, allowing the still-liquid metal to escape. The thickness of the cast shell remaining can then be used as a measure of the rate of solidification. Experiments carried out with two cast irons, one high and the other low in phosphorus, indicated that the high-phosphorus metal was the more suitable of these two irons for use in slushing tests. With the low-phosphorus iron, a deep pasty zone interfered with slushing and even with the high-phosphorus iron, difficulty was experienced in reproducing shells above 0.4 in. thick. This was due to increased roughness of the inner surface of thick cast shells.

Conclusions

From the experience gained during the trials, the fact was also developed that, when attempting to measure the effect of relatively small differences in the properties of mould materials, the section thickness of the test specimen may play an important part. Experiments showed that, using a test block 2½ in. thick, it was not possible accurately to measure the differences between the chilling properties of green-sand as against dry-sand or raw sand as against facing sand. It was therefore concluded that the method was not sufficiently sensitive to examine the thermal properties of moulding materials, and that some other method would have to be employed.

The work summarised above was carried out for the Sub-committee in the Department of Industrial Metallurgy, Birmingham University, under the supervision of Dr. V. Kondic to whom the thanks of the Sub-committee are due. The work is being further pursued under Sub-committee T.S.33, which is at present examining the possibility of using pyrometric methods for studying the rate of solidification of cast iron as influenced by various mould materials.

* Extracted from the Report of I.B.F. Sub-committee T.S.21.

(*Continued from previous column.*)

At the Imperial Hotel.

7.30 p.m. to 9.30 p.m.: A dinner and cabaret show will be held. (The Hotel have offered facilities for dancing in the ballroom after the cabaret. Evening dress is preferred for those wishing to dance.)

On Friday, April 21, there will be a Ladies' excursion. 2.0 p.m.: Coach tour *via* Newton Abbot, Ashburton, Holne Chase, Dartmeet, Forest Inn, Hexworthy, Holne, Buckfastleigh, Dart Valley, Totnes, Paignton. (Assemble in foyer, Imperial Hotel, at 1.45 p.m.)

News in Brief

JOHN I. THORNYCROFT & COMPANY, LIMITED, Westminster, London, S.W.1, have received a contract for a 600-ton floating dock for Peru.

A. REYROLLE & COMPANY, LIMITED, manufacturing electrical engineers, of Hebburn-on-Tyne, have shared £30,000 as a bonus among their some 6,000 employees in appreciation of the firm's record export shipments last year.

THE RAILWAY EXECUTIVE has placed a contract with Harland & Wolff, Limited, Belfast, for extensive alterations to the cross-channel steamer Duke of York. They include the conversion of the ship from coal to oil burning.

AN ORDER worth £A1,300,000 which has been received by the English Electric Company, Limited, for 17 electric locomotives to be used in connection with the electrification of railways around Melbourne, is to be executed at the company's Preston works.

A CLAIM for an increased rate of pay by members of the United Society of Boiler Makers and Iron and Steel Ship Builders employed on repair work by the Tees Conservancy Commission has been rejected by the National Arbitration Tribunal.

IT IS OFFICIALLY DISCLOSED that the oil-cracking plant at Wilton now being built by Imperial Chemical Industries, Limited, is expected to be completed by the end of this year. The plant will require 200,000 tons of oil per annum. This will be brought direct to the Tees by ocean-going tankers.

MONSANTO CHEMICALS, LIMITED, Waterloo Place, London, S.W.1, are ceasing production at their Sunderland South Docks tar-distilling plant. Dismantling of equipment will start in the first week of April and the remaining labour force of 45 discharged unless another firm takes over the works.

THE PATERSON ENGINEERING COMPANY, LIMITED, Kingsway, London, W.C.2, have been entrusted by the Tees Valley Water Board with a contract for the supply of plant for a new pumping station at Darlington at a cost of £82,000. The total capacity of the pumping plant is to be 92,000,000 galls. per week.

"MODERNISE WITH SOLID FUEL" is the theme of the Coal Utilisation Joint Council's exhibit (Stand No. 69, Grand Hall) at the "Daily Mail" Ideal Home Exhibition at Olympia. Appliances shown include open fires, heating stoves, and independent hot-water boilers. The stand is attracting considerable attention.

THE NEW FACTORY of Specialloid, Limited, at Leeds is now in production—some weeks ahead of schedule. The company's sales and technical departments are now operating from Black Bull Street, Leeds, 10 (telephone: Leeds 31471). In addition, a central stock record and a central stores have been set up at Leeds.

BECAUSE local engineering employers consider that the type of labour required for the project is not available among those unemployed, and must, therefore, be drawn from existing industries, the Dundee Chamber of Commerce has asked the president of the Board of Trade to withdraw a licence granted for the establishment of a new works by C. V. A. Jigs, Moulds & Tools, Limited, Hove (Sussex).

MORE THAN 1,000,000 TONS of iron has been produced by the blast furnace at the Ford Works, Dagenham, since it was relined in October, 1944. When the furnace was televised last month viewers saw some of the 18,391 tons of iron produced during the month leaving the furnace. This was the largest quantity of iron, with a silicon content of over 3 per cent., ever produced in one month by the Ford furnace.

THE RAILWAY EXECUTIVE has introduced a new system of warrant travel to enable firms to obtain rail tickets for business purposes, without payment of the fare at the time of booking. Firms using this new service can obtain at cost from the Railway Clearing House a book of 100 warrants which may be exchanged at station booking offices or British Railways' town offices for first- or third-class ordinary single and return, monthly return, or cheap-day tickets, and for sleeping-car reservations. Firms are required to deposit from £50 to £100 according to the size of their organisation.

THE PLAQUE WHICH HAS BEEN PRESENTED TO MR. D. H. WOOD BY THE COUNCIL OF IRONFOUNDRY ASSOCIATIONS, AS DESCRIBED IN LAST-WEEK'S ISSUE.

THE BROWN-BOVERI gas-turbine locomotive, which was to have had a demonstration run from Paddington to Plymouth and back last week, developed defects in the blading on the rotor of the air compressor, and the run was postponed. One of the main items contributing to the success of gas turbines for transport and industrial power is that the blading should operate for long periods at high temperatures without creep or other deformation, and much metallurgical research is being carried out on the subject. It is generally accepted that Britain leads the field in this line of research.

IN AN ADDRESS read for him at a recent luncheon of the Incorporated Sales Managers' Association in London, Mr. Wallace B. Phillips, president of the American Chamber of Commerce in London, suggested that British manufacturers who are seeking to promote their sales in the United States should pay more attention to mechanical and technical products. He said they might have to face up to some pressure groups; some American trade journals were carrying large advertisements proclaiming that a flood of imports was seriously cutting down sales of domestic manufacture. Britain was only one of 80 or 90 countries earnestly seeking markets in the United States, however, and since it was the cumulative effect that counted, this complaint might not be aimed specifically at Britain.

Ironfounders' Return from U.S.A.

The team representing the British general ironfounding industry has returned from its six weeks' visit to the U.S.A. The tour was made under the auspices of the Anglo-American Council of Productivity.

Some impressions gained during the tour were given by members of the team at a Press conference in New York before leaving for home. Mr. William Marsland, foundry technician of Newman, Hender & Company, Limited, Woodchester, Stroud, said that the application of methods and techniques observed in the United States would raise production in one operation by 30 per cent., and this could be accomplished by his own company with almost no capital outlay.

That the high quality of patterns in the United States was one of the major factors in productivity was emphasised by Mr. George W. Nicholls, general manager of the foundry and patternshop and chief metallurgist of Modern Foundries, Limited, Halifax. Mr. Evan J. Ross, foundry technician of G. & J. Weir, Limited, Glasgow, also commented on the quality of American patterns.

Training Methods Compared

Training methods in the large foundries in the United States were praised by Mr. Samuel H. Russell, chairman and director, S. Russell & Sons, Limited, Leicester, the leader of the team, who said that America was more successful than this country in attracting well-educated men to the foundry industry and to heavy industry in general. The same view was expressed by Mr. Albert Kirknan, general works manager of Sir W. H. Bailey & Company's Albion works at Patricroft, Lancs.

On the other hand, Dr. Harold T. Angus, development manager, and Mr. Walter B. Parkes, assistant development manager, of the British Cast Iron Research Association, Alvechurch, Birmingham, were able to offer the American industry helpful information on research developments in Great Britain. "We seem to have gone a bit further in research development with regard to sand than your industry," Mr. Parkes said, "probably because we do not have the quantity and variety available to you." Dr. Angus, however, said that the British visitors had been surprised to learn that the U.S.A. had gone further than the British in abandoning the emphasis on strength of iron. "For the last 20 years the industry has concentrated on developing the strength of iron and we are just now getting away from that as a primary objective of research. We found that you have made a great deal of progress in this change of emphasis to a product that can be machined quickly. There is no lack of knowledge of basic principles in either country, but there is a greater degree of application of research development in the United States."

Rail Freight Charges

The Railway Rates Tribunal has decided to ask the Minister of Transport to authorise the increase of 16⅔ per cent. in railway freight charges for which the British Transport Commission has applied. Announcing this in the House of Commons on March 15, the Minister said that the recommendation was now being considered by the Government. The Tribunal, he said, saw no alternative to the recommendation after taking into account all the arguments levelled by the trading bodies against the proposed charges.

The Minister's statement came during a general debate on transport, initiated by Mr. Peter Thorneycroft. There was a similar debate in the House of Lords on the same day, during the course of which Lord Teynham said that the price of coal would go up by 4s. a ton and steel by about 6s. In both Houses the Government was urged to ponder carefully the effect which increased freight charges would have on industrial costs.

Parliamentary

Development of Technology

In the House of Lords on March 14, LORD CALVERLEY asked what was the Government's immediate policy towards the development of higher branches of technology, and moved for papers. He said that it was high time that the Government stated definitely that they were prepared to give graduate status to the technical colleges. He sometimes wondered why the Ministry of Education, in a sense, treated those colleges as if they were the Cinderellas of colleges. The Ministry granted nearly 800 State scholarships a year, but only 100 went to the technical colleges. That was not quite fair.

The anomaly of these great colleges having to depend on the goodwill of such institutions as the London University should be removed. All that was needed was for the Ministry of Education to make a big gesture and agree to turn the technical colleges over to the University Grants Committee.

LORD CHORLEY said that technological progress was essential if the problems which confronted the country were to be solved, and the nation had only a few short years, perhaps months, to bridge the gap. The difficulty was of producing enough technologists of the very highest quality. The question was whether the nation should continue the system of training technologists in the universities, or establish some new form of training: in other words, had the universities failed in the task of training technologists? The universities would answer with an emphatic negative, and there was some overwhelming opinion that the matter could best be dealt with by the universities, and should be left to them.

LORD DARWEN, Lord in Waiting, said there was no evidence to support the view that the quality of training courses in technology in the United Kingdom was inferior to those in other European countries or the United States. Considerable expansion of facilities was needed, and reforms were in some respects overdue, but it would be wrong to take a defeatist attitude. It must be recognised that to concentrate higher technology in universities would deprive the technical colleges of some of their most valuable work.

He said that the fundamental problem was how to improve the status of higher work in the technical colleges and how to ensure that students could obtain qualifications which were equivalent to those obtained in universities. There would be serious difficulty in upgrading technical colleges and institutions to a rank equivalent to that of universities. There was abundant evidence that any proposal to confer on technical colleges or other non-university institutions the power to grant degrees would be widely opposed.

The problem had been put to the National Advisory Council for Education in Industry and Commerce nearly two years ago, with a request that the Council should consult the interests concerned and find a solution as quickly as possible. Any proposal made would need widespread support, and must not be submerged in a welter of controversy.

The motion was, by leave, withdrawn.

Spanish Steel Output in 1949

A report from Spain states that the country's production of pig-iron rose from 510,000 metric tons in 1948, to 609,576 tons in 1949, and that of steel from 596,000 tons to 728,651 tons.

Plans for increasing Spain's steel output to 2,000,000 tons per year are described as conditional upon an annual increase in coal output of 2,000,000 tons, which is unlikely of early achievement.

Company News

The information under this heading has been extracted from statements circulated to shareholders, speeches made at annual meetings, and other announcements.

John Baker & Bessemer, Limited:—The report says that the new Siemens melting plant put into operation towards the end of 1949 is now working at full capacity. The new shop for the assembly of wheels and axles continues to work at a high rate of production and has contributed a substantial quota to the year's profits. The new methods have resulted in such a reduction of costs that plans have been put in hand to extend the shop so that all wheel and axle assembly may be carried out in it.

The output of steel ingots and of manufactured steel was approximately of the same tonnage as in 1948, but its selling value was considerably greater. The output of complete wheels and axles was 8½ per cent. greater than that of 1948, and more than two and a-half times that of 1945.

During the year £150,000 4 per cent. unsecured 10-year notes have been issued to the Industrial & Commercial Finance Corporation, with the option that the company may convert them to second cumulative preference shares in the event of nationalisation of the company not becoming effective.

Steetley Company, Limited, Worksop (Notts):—The group production and sales in 1949 were again records, says MR. N. M. PEECH, the chairman. In the dolomite division, the benefit of a full year's working of the new Cadeby Works, near Doncaster, was obtained. The installation of large machinery in the quarries and the re-equipment of the processing plant at the Coxhoe Works in Durham should be completed this summer. The rebuilding of the Taffs Well Works in South Wales, modelled on the lines of the Cadeby Works, has commenced. In the refractory brick division, both the works at Oughtibridge and Worksop were undergoing re-equipment and some extensions; new products also were being developed. Thus, the financial results of this division were adversely affected. In the magnesia division, great strides were made at the Hartlepool sea-water works, which is managed by the Steetley Company. Production was no less than 30 per cent. above the previous record.

Broom & Wade, Limited:—MR. HARRY S. BROOM, the chairman, says that the company feels proud of the fact that the average prices of its standard single-acting machines have only gone up by 41 per cent. since 1938. Although the cost of coke has risen 12 per cent., and pig-iron 9 per cent. during the past year, the cost of castings from the company's foundry has not risen.

The company is exporting its products to more than 70 countries, but this trade could be increased enormously if it was able to supply its agents with adequate stocks to enable them to give prompt delivery of their orders.

Midland Electric Manufacturing Company, Limited:—New high levels were again established in both the value and the volume of the company's trading in 1949, says MR. W. L. BARBER, the chairman, who goes on, however, to re-emphasise his previous reservations regarding the difficulties and uncertainties of the immediate future, which are due, he says, to the severe limitations placed on all building activity and also to the new conditions which have arisen in several overseas markets, notably those in India and South Africa where restrictive import licensing controls are in operation.

Personal

MR. BRIAN DAVIDSON, business manager of the Bristol Aeroplane Company, Limited, since 1946, has been appointed a director of the company.

MR. S. T. FRANKS, works manager for 12 years with C. & W. Walker, Limited, engineers and ironfounders, of Donnington (Salop), has resigned to take up a position in the South of England.

MR. W. H. MCFADZEAN, deputy chairman, has also been appointed chief executive of British Insulated Callender's Cables, Limited, while DR. L. G. BRAZIER and MR. H. J. STONE have been elected to the board as executive directors.

MR. F. DOLLIN, chief turbine engineer with C. A. Parsons & Company, Limited, Newcastle-upon-Tyne, is to give an address on "Design Trends in Steam Turbines of Large Output" before the fourth World Power Conference at London in July.

MR. A. A. H. DOUGLAS, general manager of the heavy engineering division of Sheepbridge Engineering, Limited, Chesterfield, has been appointed a director and general manager of the Distington Engineering Company, Limited, Cumberland.

MR. G. N. GEE and MR. F. DOBSON, technical representatives of Edgar Allen & Company, Limited, Imperial Steel Works, Sheffield, are to spend two months in Canada visiting customers after being in attendance at the firm's exhibits at the International Trade Fair, Toronto, next May.

LORD ADAMS, general manager of the West Cumberland Industrial Development Company, Limited, who, in that capacity, has taken a leading part in encouraging new industries at West Cumberland, has had the freedom of the town of Workington conferred upon him.

ALDERMAN HAROLD ROBERTS, M.P., has resigned from the board of Fletcher, Houston & Company, Limited, ironfounders and engineers, of Dudley Port, Tipton (Staffs), on account of increasing pressure of Parliamentary duties. The vacancy on the board has been filled by the appointment of MR. W. L. THORNTON as a director.

MR. G. D. WILSON and MR. J. F. M. BRAITHWAITE have been appointed directors of Baker Perkins, Limited, manufacturing engineers, etc., of Peterborough. Mr. Wilson, who is a designer, has been with the firm for many years, while Mr. Braithwaite is sales manager of the biscuit machinery department.

MR. V. A. LOWINGER retired from the chairmanship of the International Tin Research and Development Council, which controls the Tin Research Institute, on December 31, as he is no longer permanently resident in England. His successor is MR. G. F. A. BURGESS, a joint managing director of the British Metal Corporation, Limited.

SIR HAROLD WEST, managing director of Newton Chambers & Company, Limited, has been appointed chairman of the Council of the Institute of Industrial Administration. The EARL OF VERULAM, whom Sir Harold succeeds as chairman of the Council, becomes president of the Institute. He is chairman of Enfield Rolling Mills, Limited, Enfield Cable Works, Limited, and other companies.

Meeting Cancelled

A meeting organised by the West Wales Section of the Wales and Monmouth Branch of the Institute of British Foundrymen, which was to have been held at Landore on March 31, has been cancelled as the lecturer, Mr. Austin Bevan, finds himself unable to be present. Details of a meeting at a later date will be announced shortly.

STANTON-DALE

REFINED PIG IRON

Designed to meet the demands of high quality castings, which are, strength, machineability and resistance to wear.

All these can be secured by using Stanton-Dale Refined Pig Iron in your cupolas.

The above illustration shows a group of castings made by Messrs. Goodbrand & Co. Ltd., Stalybridge, Cheshire.

PROMPT DELIVERY

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM

Company Results

(Figures for previous year in brackets.)

COLTNESS IRON COMPANY—Second interim dividend of 16⅔% (same).

QUALCAST—Interim dividend of 10% on capital doubled by share bonus (20%).

GLOVER & MAIN—Final dividend of 10%, making 15%, and bonus of 7½% (all same), the final dividend and bonus being paid on increased capital.

A. A. JONES & SHIPMAN—Profit on trading, £90,673 (£90,893); to depreciation, £15,100 (£15,725); taxation, £38,000 (£37,500); note redemption, £27,908 (£2,537); general reserve, £10,000 (same); contingencies, £2,000 (nil); forward, £49,260 (£63,292).

SHANKS & COMPANY—Trading profit for 1949, £201,537 (£222,983); net profit, after depreciation, tax, etc., £91,784 (£90,604); dividend of 17½% (same); to staff pension reserve, £30,000 (£25,000); special depreciation, £25,000 (£30,000); forward, £65,888 (£66,560).

R. W. CRABTREE & SONS—Dividend of 5%, less tax, and bonus of 1%, not subject to tax, from capital reserve, both payable on capital of £600,000, as increased last December by a three-for-one share bonus (dividend of 8%, less tax, and special non-taxable bonus of 5% on capital of £150,000).

FLETCHER, HOUSTON & COMPANY—Dividend of 40%, payable as an interim dividend in view of unavoidable delay in presenting the accounts. It is not intended to recommend any final dividend for the year. The dividend is at the same rate as for the previous year, but is payable on capital of £42,500, against £30,000.

MATHER & PLATT—Consolidated trading profit for 1949, £1,151,952 (£904,386); net profit, after depreciation, tax, etc., £300,478 (£146,194); retained by subsidiaries, £12,211 (£8,801); to general reserve, £200,000; employees' fund, £10,000; preference dividends, £11,000; final dividend of 7%, making 11% (same); forward, £113,427 (£128,661).

STEETLEY COMPANY—Consolidated trading profit for 1949, £474,773 (£367,284); net profit, after depreciation, tax, etc., £168,007 (£118,669); less minority interests, £915 (£1,124); to general reserves, £75,000 (£55,000); contingencies reserve, £15,752 (nil); final dividend of 9%, making 13% (same) on capital of £776,260 (£576,260); forward, £90,532 (£79,285).

INGALL, PARSONS, CLIVE & COMPANY—Consolidated trading profit for the year ended September 30, 1949, £19,439 (£12,738); net profit, after depreciation, taxation, etc., £8,526 (£8,527); retained by subsidiary, £32 (nil); ordinary dividend of 10% (same); deferred dividend of 10% (same); to employees' benevolent fund, £250 (£300); forward, £20,298 (£17,810).

SWITCHGEAR & COWANS—Revenue balance for 1949 (including the results of subsidiary companies), after making provision for manufacturing and administration expenses, £91,556 (£88,579); net profit, after depreciation, etc., £60,143 (£58,629); to profits tax, £11,500 (£11,000); income tax, £22,837 (£30,239); dividend of 20% (same); pension fund, £1,000 (same); forward, £41,251 (£32,945).

BROWN BROS.—Consolidated net trading profit for 1949, after deducting emoluments of directors of Brown Bros., £409,911 (£428,109); balance available to Brown Bros., after tax, etc., £159,241 (£166,761); to general reserve, £51,511 (£25,000); stock reserve, £25,000 (£65,000); dividend of 10% on capital of £1,089,600 as doubled by a scrip bonus of 100% (20%); forward, £241,905 (£228,384).

SMALL & PARKES—Trading profit for the year to November 30, 1949, £200,761 (£255,041); net profit, after depreciation, taxation, etc., £68,782 (£95,449); to general reserve, £25,000 (same); benevolent fund, £1,000 (same); stock depreciation reserve, nil (£25,000); re-equipment reserve, £15,000 (£22,479); pensions, £4,500 (nil); dividend and bonus of 30% (same); forward, £43,877 (£41,755).

ENGLISH CLAYS LOVERING POCHIN & COMPANY—Consolidated trading profit to September 30, 1949, £776,558 (£574,483); parent company's net profit, after depreciation and amounts written off, tax, etc., £292,160 (£222,745); to contingencies reserve, £35,000 (same); general reserve, £50,000 (same); preference dividends, £35,624 (same); ordinary dividend of 5%, £60,828 (same); forward, £238,753 (£131,045).

THOMAS ROBINSON & SON—Trading profit for 1949, £142,103 (£103,494); to depreciation, £18,591 (£13,007); interest, £4,418 (£6,630); net income tax charge on profits and investment income, £41,654 (£26,554); less Australian tax credit, £687 (£1,560); profits tax, £16,376 (£11,297); directors' emoluments, £16,170 (£16,173); preference dividend, £6,188 net (same); ordinary dividend of 7½% (same); forward, £97,303 (£68,223).

DELTA METAL COMPANY—Group trading profit for 1949, £693,661 (£950,764); balance, after depreciation, taxation, etc., £182,934 (£193,470), of which £15,165 (£25,171) is carried forward in subsidiary accounts, leaving £167,769 (£168,299) credited to appropriation account; to general reserve, £25,000 (same); dividend equalisation reserve, £25,000 (same); benefit fund, £5,000 (same); dividend of 12½% and bonus of 25%, both tax free (same); forward, £39,494 (£39,225).

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference E.P.D. or C.R.E. can be obtained from the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, London, S.W.1.

GLASGOW, March 31—Gunmetal work, iron castings, etc., for the City Council. The Director of Cleansing, 33, Stockwell Street, Glasgow, C.1.

DUBLIN, April 12—Approx. 6,000 yds. of large dia. mild-steel pipes, etc., for the City Council. The City Engineer, 28, Castle Street, Dublin.

NEWTON-LE-WILLOWS, March 31—Iron castings, for the Urban District Council. The Engineer and Surveyor, Market Chambers, Newton-le-Willows.

FYLDE, April 3—Contract No. 35.—Cast-iron gutters and rainwater pipes, for the Water Board. Mr. H. W. Apted, engineer, Sefton Street, Blackpool.

NARBERTH, March 30—Supply and laying of 6,740 yds. of 3-in. dia. spun-iron pipelines, etc., for the Rural District Council. J. O. Parry & Lewis, Arcade Chambers, Ammanford. (Deposit, £3 3s.)

PLYMPTON ST. MARY, March 31—Provision and laying of cast-iron inlet and outlet mains, etc., for the Rural District Council. The Engineer and Surveyor, Council Offices, Plympton, S. Devon. (Deposit, £2 2s.)

ALCESTER, April 15—Provision and laying of spun-iron water mains, etc., for the Rural District Council. J. D. & D. M. Watson, consulting engineers, 18, Queen Anne's Gate, Westminster, London, S.W.1. (Deposit, £10 10s.)

SWADLINCOTE AND ASHBYS, April 3—Laying and jointing of about 10 miles of 12-in. and 10-in. dia. spun-iron concrete-lined water mains, for the Joint Water Board. Pick, Everard, Keay & Gimson, engineers, 6, Millstone Lane, Leicester. (Deposit, £2 2s.)

ISLE OF WIGHT, April 17—Supply and construction of approx. 5 miles of spun-iron water mains (12-in. to 3-in. dia.), and a pressed steel tank of about 50,000 gall. capacity, etc., for the Rural District Council. Lemon & Blizard, Castle Lane, Southampton. (Deposit, £5 5s.)

New Companies

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

TEXTILE MACHINE WORKS (LEICESTER), 18, Austin Friars, London, E.C.2—£10,000.

BLAXTON ENGINEERS—£10,000. A. W. Smith, Harworth House, Bawtry (Yorks), subscriber.

P.I. CASTINGS (ALTRINCHAM)—£10,000. K. O. Mackenzie, Flaxhigh, Hale Barns (Ches), and E. N. Jackson.

STAHLUNION COMPANY—Ironfounders, etc. £25,000. G. Marcar, 2, Roehampton Gate, London, S.W.15, and E. F. J. Perkins.

DAVIDSONS, ENGINEERS (MANCHESTER), Hayes Yard, Garratt Street, Oldham Road, Manchester, 10—£10,000. R. and I. Davidson.

DAVID BUDWORTH, Harwich Shipyard, Harwich (Essex)—Shipbuilders and repairers. £20,000. D. D. Budworth, J. Blewett, and P. D. Hare.

JAMES WILEY & SONS, The Green, Darlaston (Staffs)—To take over business of nut and bolt manufacturers carried on at Darlaston by James Wiley & Sons Holdings. £200,000. F. F., L. P., L., and M. Wiley.

TITANIUM PRODUCTS, Bilton House, 113, Park Lane, London, W.1—To enter into an agreement with Carbometals and Leon Nussbaum, and to carry on business of producers, smelters, and workers of hard facing and other metals, etc. £50,000. P. Bilton, L. Nussbaum, and W. L. Hill.

Increases of Capital

Details of increased capital have been announced by the following companies:—

PHOENIX CASTINGS, LIMITED, Coventry, increased by £17,500, in £1 ordinary shares, beyond the registered capital of £2,500.

BRUNTON & COMPANY, LIMITED, metal merchants, etc., of Gresham Street, London, E.C.2, increased by £24,750, in 19,000 ordinary shares of 5s. and 20,000 5 per cent. redeemable cumulative preference shares of £1, beyond the registered capital of £250.

HEDIN, LIMITED, manufacturers of electrical heating apparatus, etc., of South Woodford, London, E.18, increased by £8,000, in 3,000 ordinary and 5,000 5 per cent. cumulative participating preference shares of £1 each, beyond the registered capital of £2,000.

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THE GLENBOIG UNION FIRECLAY CO., LTD.,
48, WEST REGENT STREET, GLASGOW, C.2

EXPORT AGENTS: GENERAL REFRACTORIES LTD., GENEFAX HOUSE, SHEFFIELD, 10

Raw Material Markets

Iron and Steel

The continued expansion of the output of steel ingots is not matched by a corresponding increase in pig-iron production. There are fewer blast furnaces operating than there were a year ago, and last month there was a drop in the aggregate output. Supplies of basic iron have not, apparently, fallen short of melting-shop requirements, and somewhat larger tonnages of hematite and refined iron are available. The demand for low- and medium-phosphorus iron cannot be fully satisfied, but available tonnages of high-phosphorus iron are not always readily absorbed.

The re-rollers are still finding business very slow for many of their products. There is a keen demand for the smallest sizes of sections and bars from the light mills, but relatively little call for other sizes. Consumers and stockholders have good stocks. Orders on hand for the export market take up some production, but a larger tonnage could be accepted and would be welcomed.

Sheets are in exceptional demand, and the strip mills also have good order-books. Exceptionally heavy shipments of steel plates tend to limit home supplies and many consumers are likely to find that they have not received their full allocations at the end of the current period. Rail mills still have substantial rolling programmes which include big tonnages for overseas.

Non-ferrous Metals

The outstanding feature in the February copper statistics, published by the Copper Institute in New York, was the sensational drop in stocks of refined copper in producers' hands. This tonnage has been on the downward grade for some months now, but it is not very long ago that the reserve was in the neighbourhood of 200,000 short tons. At January 31 the total was 101,000 short tons, but the figure at the end of February was only 77,000 tons. This is equal to only about 70 per cent. of a month's consumption and will probably be regarded as a dangerously low level. Output of refined copper stood at 94,000 short tons in February, which was a full 1,000 tons lower than the January figure. The fall in the production of crude copper was more marked, for the January figure of 85,600 tons came down to 81,200 tons. Deliveries of refined copper to domestic consumers were up by about 1,000 tons at 112,780 tons. These are all most encouraging figures and afford strong support to the theory that there is no immediate likelihood of any reduction in the US copper quotation. In fact, it would not be at all surprising if an upward trend were to develop in the near future, for sales for March so far have been quite good. Should the Custom smelters give the market a lead by raising their buying limit for scrap, then we might well see electrolytic copper up to 20 cents. This would mean a quotation of about £165 here.

Last week saw a rise of 25 points in the US zinc price, in consequence of which the Ministry of Supply raised its price in the United Kingdom by £2 to £87 10s. Lead, on the other hand, was weak, and in New York the price declined to 10½ cents, followed by a cut of £4 here to £84. Even so, lead does not look any too strong and may well be down to 10 cents in New York and £80 here before long. The opinion is being freely expressed that an end to the bulk purchasing of lead is overdue and should be brought about promptly. Considerable quantities of soft-currency lead are available and a reopening of the London market should now be quite feasible. Strange as it may seem, an allocation scheme for this metal still obtains in the United Kingdom, although it is probable that consumers have no trouble in securing all the metal they want. Tin has been an erratic market; the three months' price has moved up above £600, thus establishing a contango.

Metal Exchange tin quotations were as follow:—

Cash—Thursday, £600 to £600 15s.; Friday, £598 10s. to £598 15s.; Monday, £599 5s. to £599 10s.; Tuesday, £602 10s. to £602 15s.; Wednesday, £604 to £604 10s.

Three Months—Thursday, £601 to £601 10s.; Friday, £598 10s. to £599; Monday, £599 5s. to £599 10s.; Tuesday, £603 10s. to £604; Wednesday, £604 10s. to £605.

New Trade Marks

The following applications to register trade marks appear in the "Trade Marks Journal":—

"RADIATION"—Gas meters. RADIATION, LIMITED, Radiation House, Thimble Mill Lane, Aston, Birmingham, 6.

"LILCO"—Steel sections, pig-iron, etc. THE LILLESHALL COMPANY, LIMITED, Priors Lee Hall, near Shifnal (Shrops).

"RAMFRACK"—Refractory materials, etc. NU-WAY HEATING PLANTS, LIMITED, 54, Gillhurst Road, Birmingham, 17.

"CONFAX"—Textile machinery. J. FARRAR ENGINEERING COMPANY, LIMITED, Albion Iron Works, Beacon Road, Halifax.

"FARFAC"—Agricultural implements and machinery, etc. FARM FACILITIES, LIMITED, 150, Marylebone Road, London, N.W.1.

"VAX"—Electric motors and generators. METROPOLITAN-VICKERS ELECTRICAL COMPANY, LIMITED, Number One, Kingsway, London, W.C.2.

"TRUVOX"—Machines and parts included in Class 7. TRUVOX ENGINEERING COMPANY, LIMITED, Truvox House, Exhibition Grounds, Wembley (Middx).

"ALPOL"—All goods included in Class 11 made of aluminium or of aluminium alloys. UNITED ANODISING, LIMITED, 50, Gresham Street, London, E.C.2.

"BEAVERCROFT"—Agricultural machinery and parts. TRANSPORT EQUIPMENT (THORNYCROFT), LIMITED, Thornycroft House, Smith Square, London, S.W.1.

"SPIRALARM"—Instruments and apparatus for the automatic detection of combustible gases. G. H. NAYLOR, LIMITED, Central Brass Works, Wiend, Wigan.

"BEMCO" (DEVICE)—Unwrought common metals. BRITISH ELECTRO METALLURGICAL COMPANY, LIMITED, Grange Mill Lane works, Grange Mill Lane, Wincobank, Sheffield.

"FLOWRATOR" and DEVICE—Apparatus for measuring the flow of fluids. SOLWAY FLOWRATORS, LIMITED, Electroflo Building, Abbey Road, Park Royal, London, N.W.10.

"THERMAX"—Unwrought and partly-wrought common metals. SHEEPBRIDGE STOKES CENTRIFUGAL CASTINGS COMPANY, LIMITED, Sheepbridge Works, Chesterfield (Derbyshire).

"BIRMIDAL"—Engines for road and rail vehicles. BIRMINGHAM ALUMINIUM CASTINGS (1903) COMPANY, LIMITED, Birmid Works, Dartmouth Road, Smethwick, Birmingham.

"BRONTALLOY"—Sintered products of aluminium oxide and metal particles, for use as grinding and cutting compounds. SYDNEY FRANCIS, Bleak House, Drighlington, near Bradford.

"DISTICOKE"—Coke ovens, etc. SOCIETE DE DISTILLATION DES COMBUSTIBLES ET DE CONSTRUCTION DE FOURS A COKE "DISTICOKE," c/o Chatwin & Company, 253, Gray's Inn Road, London, W.C.1.

"FLOWTROL"—Apparatus for measuring and controlling the rate of flow of liquids. W. EDWARDS & COMPANY (LONDON), LIMITED, Allendale Works, Worsley Bridge Road, Lower Sydenham, London, S.E.26.

"BIRMIDAL"—Unwrought and partly wrought common metals and aluminium alloys. BIRMINGHAM ALUMINIUM CASTINGS (1903) COMPANY, LIMITED, Birmid Works, Dartmouth Road, Smethwick, Birmingham, 40.

"VIBROLATOR"—Pneumatic vibrating mechanisms for use with foundry moulding apparatus. EDWIN FRANKLIN PETERSON, c/o Frank B. Dehn & Company, Kingsway House, 103, Kingsway, London, W.C.2.

"HALLAMITE"—Unwrought and partly-wrought common metals. HALLAMSHIRE STEEL & FILE COMPANY, LIMITED, Hallam-partly-wrought common metals. SHEEPBRIDGE STOKES CENTRIFUGAL shire Works, Bardwell Road, Sheffield, 3.

GREAT BRIDGE FOUNDRY COMPANY, LIMITED, intends to construct a new factory at Sheepwash Lane, West Bromwich.